SEQUENCE LISTING

<110> LOOSMORE, Sheena M.
YANG, Yan-Ping
KLEIN, Michel H.

<120> PROTECTIVE RECOMBINANT HAEMOPHILUS INFLUENZAE HIGH MOLECULAR WEIGHT PROTEINS

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<170> PatentIn Ver. 2.1

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Asn Gly Lys Gly Phe Arg Phe Glu Asn Ala Ser Leu Asn Gly Ile Gly
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<210> 28
<211> 1220
<212> PRT
<213> Haemophilus influenzae

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Ser Pro Thr Glu Asp Phe Pro Thr Gly Ala Gly Gly Lys Asp Asn Pro
            20                  25                  30

Lys Lys Asn Ala His Asn Lys Pro Thr Leu Ile Asn Thr Thr Leu Glu
        35                  40                  45

Arg Ile Leu Ser Gly Asn Thr Phe Val Asn Ile Thr Ala Arg Lys Arg
    50                  55                  60

Ile Thr Val Asn Ser Asp Ile Asn Ile Lys Asp Ser Ser His Leu Ile
65                  70                  75                  80

Leu Trp Ser Glu Asn Asp Asn Ser Ser Gly Val Asp Ile Lys Gly Asn
                85                  90                  95

Ile Thr Ser Thr Thr Gly Gly Ser Leu Thr Ile Tyr Ser Ser Gly Trp
            100                 105                 110

Ile Asp Ile His Lys Asn Ile Thr Leu Asn Ser Gly Leu Leu Asn Ile
        115                 120                 125

Thr Thr Lys Gln Gly Asp Ile Ala Phe Glu Lys Gly Asn Asn Pro Thr
    130                 135                 140

Ile Thr Gly Gln Gly Thr Ile Thr Ala Gly Asn Gly Lys Gly Phe Arg
145                 150                 155                 160

Phe Glu Asn Ala Ser Leu Asn Gly Ile Gly Thr Gly Leu Leu Phe Asn
                165                 170                 175

Ile Lys Arg Asp Leu Gly Asn Asn Phe Gln Ile Ile Asn Phe Phe Asn
            180                 185                 190

Gly Thr Leu Asn Ile Ser Gly Lys Val Asn Ile Ser Met Val Ile Pro
        195                 200                 205

Lys Lys Trp Asp Tyr Ser Lys Phe Arg Gly Arg Thr Tyr Trp Asn Val
    210                 215                 220

Thr His Leu Asn Val Ser Glu Gly Ser Lys Phe Asn Leu Thr Ile Asp
225                 230                 235                 240

Ser Arg Gly Asp Asp Thr Ala Gly Thr Leu Asn Thr Pro Tyr Asn Leu
                245                 250                 255

Asn Gly Ile Ser Phe Asn Lys Asp Thr Ile Phe Asp Val Lys Gln Asn
            260                 265                 270

Gly Ala Val Thr Phe Asp Ile Lys Ala Pro Ile Gly Val Asn Asn Asn
        275                 280                 285

Arg Asn Leu Asn Tyr Ala Ser Phe Asn Gly Asn Ile Ser Val Ser Gly
    290                 295                 300

Gly Gly Asn Val Thr Phe Lys Leu Leu Ala Ser Ser Ser Thr Ala Gln
305                 310                 315                 320

Thr Pro Gly Val Phe Ile Asn Ser Lys His Phe Asn Ala Ser Gly Gly
                325                 330                 335
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Ser Ser Leu Glu Phe Arg Thr Glu Gly Ser Thr Lys Val Gly Phe Leu
            340                 345                 350

Ile Asn Asn Asp Leu Thr Leu Asn Ala Thr Gly Gly Asn Ile Ser Leu
        355                 360                 365

Leu Gln Val Glu Gly Ile Asp Gly Met Ile Gly Lys Gly Val Val Ala
    370                 375                 380

Lys Lys Asn Ile Thr Phe Ala Gly Gly Asn Ile Thr Phe Gly Ser Lys
385                 390                 395                 400

Lys Ala Ile Thr Glu Ile Glu Gly Asn Ala Thr Ile Asn Asn Asn Ala
                405                 410                 415

Asn Val Thr Leu Ile Gly Ser Asp Phe Asp Asn His Gln Lys Pro Leu
            420                 425                 430

Thr Ile Lys Lys Asp Val Ile Ile Asn Ser Gly Asn Leu Thr Ala Gly
        435                 440                 445

Gly Asn Val Ile Asn Ile Asn Gly Asn Leu Thr Val Asn Asn Gly Ala
                450                 455                 460

Asn Leu Lys Ala Ile Thr Asn Phe Thr Phe Asn Val Gly Gly Leu Phe
465                 470                 475                 480

Asp Asn Lys Gly Asn Ser Asn Ile Ser Ile Ala Arg Gly Gly Ala Lys
                485                 490                 495

Phe Lys Asp Ile Asn Asn Thr Ser Ser Leu Asn Ile Thr Thr Asn Ser
            500                 505                 510

Asp Thr Thr Tyr Arg Thr Ile Ile Glu Gly Asn Ile Thr Asn Lys Ala
        515                 520                 525

Gly Asp Leu Asn Ile Ile Asp Asn Lys Gly Asn Ala Glu Ile Gln Ile
    530                 535                 540

Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp
545                 550                 555                 560

Lys Ile Asn Ile Thr Asn Gln Ile Thr Ile Lys Lys Gly Val Asn Lys
                565                 570                 575

Glu Asp Ser Asp Ser Ser Thr Ala Asn Asn Ala Asn Leu Thr Ile Lys
            580                 585                 590

Thr Lys Glu Leu Gln Leu Thr Gly Asp Leu Asn Ile Ser Gly Phe Asp
        595                 600                 605

Lys Ala Glu Ile Thr Ala Lys Glu Gly Ala Asp Leu Ile Ile Gly Asn
    610                 615                 620

Ser Asp Asn Asn Asn Asn Ala Asn Ala Lys Lys Val Thr Phe Asn Gln
625                 630                 635                 640

Val Lys Asp Ser Lys Ile Ser Ala Gly Ser His Asn Val Thr Leu Asn
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645 650 655

Ser Lys Val Glu Thr Ser Asn Gly Asn Asn Asp Ala Glu Ser Asn Asn
660 665 670

Gly Asp Ser Thr Ser Leu Thr Ile Asn Ala Lys Asn Val Thr Val Asn
675 680 685

Asn Asn Ile Thr Ser His Lys Thr Val Asn Ile Thr Ala Ser Glu Asn
690 695 700

Val Thr Thr Lys Ala Gly Thr Thr Ile Asn Ala Thr Ile Gly Ser Val
705 710 715 720

Glu Val Thr Ala Lys Thr Gly Asp Ile Lys Gly Gly Ile Glu Ser Asn
725 730 735

Ser Gly Asn Val Asn Ile Thr Ala Ser Gly Asp Thr Leu Asn Val Ser
740 745 750

Asn Ile Thr Gly Gln Asn Val Thr Val Ala Ala Ala Ser Gly Ala Val
755 760 765

Thr Thr Thr Lys Gly Ser Thr Ile Asn Ala Thr Thr Gly Asn Ala Asn
770 775 780

Ile Thr Thr Lys Thr Gly Glu Ile Asn Gly Glu Val Lys Ser Ala Ser
785 790 795 800

Gly Asn Val Asn Ile Thr Ala Ser Gly Asn Thr Leu Asn Val Ser Asn
805 810 815

Ile Thr Gly Gln Asn Val Thr Val Thr Ala Asn Ser Gly Ala Ile Thr
820 825 830

Thr Thr Glu Gly Ser Thr Ile Asn Ala Thr Thr Gly Asp Ala Asn Ile
835 840 845

Thr Thr Gln Thr Gly Asn Ile Asn Gly Lys Val Glu Ser Ser Ser Gly
850 855 860

Ser Val Thr Leu Ile Ala Thr Gly Gln Thr Leu Ala Val Gly Asn Ile
865 870 875 880

Ser Gly Asp Thr Val Thr Ile Thr Ala Asp Lys Gly Lys Leu Thr Thr
885 890 895

Gln Thr Ser Ser Lys Ile Asn Gly Thr Lys Ser Val Thr Thr Ser Ser
900 905 910

Gln Ser Gly Asp Ile Ser Gly Thr Ile Ser Gly Asn Thr Val Ser Val
915 920 925

Ser Ala Thr Gly Ser Leu Thr Thr Gln Ala Gly Ser Lys Ile Glu Ala
930 935 940

Lys Thr Gly Glu Ala Asn Val Thr Ser Ala Thr Gly Thr Ile Gly Gly
945 950 955 960

Thr Ile Ser Gly Asn Thr Val Asn Val Thr Ala Asn Thr Asp Asn Leu
965 970 975

Thr Ile Lys Asp Gly Ala Arg Ile Lys Ala Thr Gly Gly Ala Val Thr
980 985 990

Leu Thr Ala Thr Gly Gly Thr Leu Thr Thr Glu Thr Ser Ser Asp Ile
995 1000 1005

Thr Ser Ser Asn Gly Gln Thr Thr Leu Thr Ala Lys Asp Ser Ser Ile
1010 1015 1020

Ala Gly Ser Ile Asn Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Thr
1025 1030 1035 1040

Leu Thr Thr Val Ala Gly Ser Lys Ile Glu Ala Ala Ser Gly Thr Leu
1045 1050 1055

Val Ile Asn Ala Lys Asp Ala Gln Leu Asp Gly Ala Ala Leu Gly Asp
1060 1065 1070

Arg Thr Glu Val Asn Val Thr Asn Ala Asn Gly Ser Gly Ser Val Ile
1075 1080 1085

Ala Thr Thr Ser Ser Arg Val Asn Ile Thr Gly Asp Leu Ile Thr Ile
1090 1095 1100

Asn Gly Leu Asn Ile Ile Ser Lys Asn Gly Lys Asn Thr Val Leu Leu
1105 1110 1115 1120

Lys Gly Val Glu Ile Asp Val Lys Tyr Ile Gln Pro Gly Ile Ala Ser
1125 1130 1135

Val Tyr Glu Val Ile Glu Ala Lys Arg Ala Leu Glu Lys Val Lys Asp
1140 1145 1150

Leu Ser Asp Glu Glu Arg Glu Ala Leu Ala Lys Leu Gly Val Ser Ala
1155 1160 1165

Val Arg Phe Ile Glu Pro Asn Asn Thr Ile Thr Val Asp Thr Gln Asn
1170 1175 1180

Glu Phe Ala Thr Arg Pro Leu Ser Arg Ile Val Ile Ser Glu Gly Arg
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Ala Cys Phe Ser Asn Ser Asp Gly Ala Thr Val Cys Val Asn Ile Ala
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Asp Asn Gly Arg
1220

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<211> 2928
<212> DNA
<213> Haemophilus influenzae

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aataatcagt ctaaaaaaac actaacaagc tcaatccttg agaacatcct gaaaaaaggc 180
tcttttgtta acattactgc cactgataac atctacgtta atagctctat caacatcgga 240
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cactccaata tttcacttgg tacgggtttt ttgaacatta cctctaatgg ttccgtggct 420
tttgagaagg cagacaaaga taaggcacgt agcgcggcag atgctcaaat tgtcgcacaa 480
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<210> 30
<211> 975
<212> PRT
<213> Haemophilus influenzae

<400> 30
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Glu Asn Ile Asn Asn Pro Lys Val Asn Asn Gln Ser Lys Lys Thr Leu
        35                  40                  45

Thr Ser Ser Ile Leu Glu Asn Ile Leu Lys Lys Gly Ser Phe Val Asn
    50                  55                  60

Ile Thr Ala Thr Asp Asn Ile Tyr Val Asn Ser Ser Ile Asn Ile Gly
65                  70                  75                  80

Asp Ser Gly His Leu Ile Leu Ser Gly Gly Gly Arg Asn Gly Gly Gly
                85                  90                  95

Val Lys Ile Asn Lys Asn Ile Thr Ser Thr Gly Gly Ser Leu Thr Ile
            100                 105                 110

Asn Ser Lys Gly Trp Val Asp Ile His Ser Asn Ile Ser Leu Gly Thr
        115                 120                 125

Gly Phe Leu Asn Ile Thr Ser Asn Gly Ser Val Ala Phe Glu Lys Ala
    130                 135                 140

Asp Lys Asp Lys Ala Arg Ser Ala Ala Asp Ala Gln Ile Val Ala Gln
145                 150                 155                 160

Gly Ile Ile Asn Leu Thr Gly Glu Asn Lys Thr Phe Arg Leu Asn Asn
                165                 170                 175

Val Ser Leu Asn Gly Val Gly Gln Gly Leu Ser Ile Thr Ser Asn Val
            180                 185                 190

Gly Asn Gln Thr His Lys Phe Asp Gly Glu Ile Asn Ile Thr Gly Asn
        195                 200                 205

Val Thr Ile Asn Gln Thr Ala Pro Ala Thr Thr Ala Tyr Trp Asn Phe
    210                 215                 220

Ser Tyr Asp Ser Tyr Trp Asn Val Ser Thr Leu Asn Val Gln Lys Asn
225                 230                 235                 240

Ser Ser Phe Thr Phe Ile Lys Arg Thr Glu Ser Asn Arg Phe Gly Pro
                245                 250                 255

Thr Thr Pro Leu Arg Ser Ser Gly Gly Val Phe Phe Asn Gly Thr Asn
            260                 265                 270

Gly Asn Met Val Leu Asn Val Gly Thr Asn Ser Arg Val Leu Phe Asn
        275                 280                 285

Leu Lys Pro Asn Glu Asn Thr Asn Asn Ser Lys Pro Leu Pro Leu Gln
    290                 295                 300

Phe Asn Ala Asn Ile Thr Ala Ile Gly Gly Gly Ser Val Ser Phe Asp
305                 310                 315                 320

Ile His Ala Asn His Ser Gly Arg Gly Ala Glu Leu Lys Met Asn Thr
                325                 330                 335
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Ile Asn Ile Ser Asp Gly Thr Ser Leu Thr Leu Gln Ser His Val Arg
340 345 350

Lys Asp Ser Ala Phe Ile Ile Ser Lys Asp Leu Thr Ile Asn Ala Thr
355 360 365

Gly Ser Asn Phe Thr Leu Glu Gln Ser Pro Asp Ser Phe Thr Asp Lys
370 375 380

Tyr Pro Gly Arg Ala Ile Ser Ser Thr Lys Asn Ile Thr Ile Ser Gly
385 390 395 400

Gly Asn Val Ser Leu Gly Gly Gln Asn Ser Ser Ser Asp Ile Lys Gly
405 410 415

Asn Ile Thr Ile Lys Ser Ser Thr Asn Val Thr Leu Lys Ala His Asn
420 425 430

Ser Pro Arg Asp Phe Ala Ser Arg Thr Leu Thr Leu Gly Asn Leu Asn
435 440 445

Val Glu Gly Asn Leu Thr Leu Thr Gly Ser Val Ala Asp Ile Lys Gly
450 455 460

Asn Leu Ser Ile Leu Asn Asp Ala Thr Phe Lys Gly Glu Thr Ser Glu
465 470 475 480

Asn Leu Asn Ile Thr Gly Asn Phe Thr Asn Asn Gly Thr Ala Asp Ile
485 490 495

Asn Ile Lys Gln Gly Val Val Asn Ile Gln Gly Asn Ile Thr Asn Lys
500 505 510

Gly Gly Leu Asn Ile Thr Thr Asn Ala Gln Asn Asn Gln Lys Thr Ile
515 520 525

Ile Asn Gly Asn Ile Thr Asn Glu Gly Gly Asp Leu Asn Ile Lys Asp
530 535 540

Ser Asn Asn Asn Ala Glu Ile Gln Ile Gly Gly Asn Ile Ser Gln Lys
545 550 555 560

Lys Gly Asn Leu Thr Ile Ser Ser Asp Lys Ile Asn Ile Thr Lys Lys
565 570 575

Ile Thr Ile Lys Ala Gly Val Asp Glu Gly Gly Ser Asp Ser Ser Pro
580 585 590

Ala Ser Asn Ala Asn Leu Thr Ile Lys Thr Lys Thr Leu Glu Leu Thr
595 600 605

Gly Asp Leu Asn Ile Ser Gly Phe Asn Lys Ala Glu Ile Thr Ala Lys
610 615 620

Asn Gly Asn Asp Leu Thr Ile Gly Lys Ala Ser Asp Gly Asn Ala Asn
625 630 635 640

Ala Lys Lys Val Thr Phe Asp Lys Val Lys Asp Ser Lys Ile Ser Ala

645 650 655

Asn Gly His Asn Val Thr Leu Asn Ser Lys Val Glu Thr Ser Asn Ser
660 665 670

Asp Ser Ser Ala Asp Asp Ser Asn Asp Asn Asn Thr Gly Leu Thr Ile
675 680 685

Ser Ala Lys Asp Val Thr Val Asn Asn Asp Val Thr Ser His Lys Thr
690 695 700

Ile Asn Ile Ser Ala Thr Thr Gly Asn Val Thr Thr Lys Glu Ser Thr
705 710 715 720

Thr Ile Asn Ala Ala Thr Gly Ser Val Glu Val Thr Ala Lys Thr Gly
725 730 735

Asp Ile Ser Gly Thr Ile Ser Gly Asn Thr Val Asn Val Thr Ala Thr
740 745 750

Asp Ser Leu Thr Thr Gln Ala Ser Ser Ser Ile Thr Ser Ser Asn Gly
755 760 765

Gln Thr Thr Leu Thr Ala Lys Asn Gly Ser Ile Ala Gly Ser Ile Asp
770 775 780

Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Val Ala
785 790 795 800

Gly Ser Asn Ile Lys Ala Thr Ser Gly Thr Leu Ala Ile Asn Ala Lys
805 810 815

Asp Ala Lys Leu Asp Gly Thr Ala Ser Gly Asp Arg Thr Val Val Asn
820 825 830

Ala Thr Asn Ala Ser Gly Ser Gly Ser Val Thr Ala Ala Thr Ser Ser
835 840 845

Asn Val Asn Ile Thr Gly Asp Leu Ser Thr Ile Asn Gly Leu Asn Ile
850 855 860

Ile Ser Lys Asn Gly Lys Asn Thr Val Val Leu Lys Gly Ala Glu Ile
865 870 875 880

Asp Val Lys Tyr Ile Gln Pro Gly Val Ala Ser Ala Asn Glu Val Ile
885 890 895

Glu Ala Lys Arg Ala Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu
900 905 910

Arg Glu Thr Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Val Glu
915 920 925

Pro Asn Asn Thr Ile Thr Val Asn Thr Gln Asn Glu Phe Thr Thr Arg
930 935 940

Pro Ser Ser Gln Val Thr Ile Ser Glu Asp Lys Ala Cys Phe Ser Ser
945 950 955 960

Gly Asn Gly Ala Ala Val Cys Thr Asn Val Thr Asp Asp Arg Gln
965 970 975

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<211> 2910
<212> DNA
<213> Haemophilus influenzae

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gatttatctg atgaagaaag agaaacatta gctaaacttg gtgtaagtgc tgtacgtttt 2760
gttgagccaa ataatacaat tacagtcaat acacaaaatg aatttacaac cagaccgtca 2820
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tgtactaatg ttactgacga tagacagtaa 2910

<210> 32
<211> 969
<212> PRT
<213> Haemophilus influenzae

<400> 32

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Pro Asp Asn Val Ser Ile Glu Asn Pro Ser Thr Glu Arg Asn Asp Ser
  1               5                  10                  15

Asn Glu Asp Leu Glu Tyr Thr Gly Thr Gly Glu Asn Ile Asn Asn Pro
             20                  25                  30

Lys Val Asn Asn Gln Ser Lys Lys Thr Leu Thr Ser Ser Ile Leu Glu
         35                  40                  45

Asn Ile Leu Lys Lys Gly Ser Phe Val Asn Ile Thr Ala Thr Asp Asn
     50                  55                  60

Ile Tyr Val Asn Ser Ser Ile Asn Ile Gly Asp Ser Gly His Leu Ile
 65                  70                  75                  80

Leu Ser Gly Gly Gly Arg Asn Gly Gly Gly Val Lys Ile Asn Lys Asn
                 85                  90                  95

Ile Thr Ser Thr Gly Gly Ser Leu Thr Ile Asn Ser Lys Gly Trp Val
            100                 105                 110

Asp Ile His Ser Asn Ile Ser Leu Gly Thr Gly Phe Leu Asn Ile Thr
        115                 120                 125

Ser Asn Gly Ser Val Ala Phe Glu Lys Ala Asp Lys Asp Lys Ala Arg
    130                 135                 140

Ser Ala Ala Asp Ala Gln Ile Val Ala Gln Gly Ile Ile Asn Leu Thr
145                 150                 155                 160

Gly Glu Asn Lys Thr Phe Arg Leu Asn Asn Val Ser Leu Asn Gly Val
                165                 170                 175

Gly Gln Gly Leu Ser Ile Thr Ser Asn Val Gly Asn Gln Thr His Lys
            180                 185                 190

Phe Asp Gly Glu Ile Asn Ile Thr Gly Asn Val Thr Ile Asn Gln Thr
        195                 200                 205

Ala Pro Ala Thr Thr Ala Tyr Trp Asn Phe Ser Tyr Asp Ser Tyr Trp
    210                 215                 220

Asn Val Ser Thr Leu Asn Val Gln Lys Asn Ser Ser Phe Thr Phe Ile
225                 230                 235                 240

Lys Arg Thr Glu Ser Asn Arg Phe Gly Pro Thr Thr Pro Leu Arg Ser
                245                 250                 255

Ser Gly Gly Val Phe Phe Asn Gly Thr Asn Gly Asn Met Val Leu Asn
            260                 265                 270
```

```
Val Gly Thr Asn Ser Arg Val Leu Phe Asn Leu Lys Pro Asn Glu Asn
        275                 280                 285

Thr Asn Asn Ser Lys Pro Leu Pro Leu Gln Phe Asn Ala Asn Ile Thr
    290                 295                 300

Ala Ile Gly Gly Gly Ser Val Ser Phe Asp Ile His Ala Asn His Ser
305                 310                 315                 320

Gly Arg Gly Ala Glu Leu Lys Met Asn Thr Ile Asn Ile Ser Asp Gly
                325                 330                 335

Thr Ser Leu Thr Leu Gln Ser His Val Arg Lys Asp Ser Ala Phe Ile
            340                 345                 350

Ile Ser Lys Asp Leu Thr Ile Asn Ala Thr Gly Ser Asn Phe Thr Leu
        355                 360                 365

Glu Gln Ser Pro Asp Ser Phe Thr Asp Lys Tyr Pro Gly Arg Ala Ile
    370                 375                 380

Ser Ser Thr Lys Asn Ile Thr Ile Ser Gly Gly Asn Val Ser Leu Gly
385                 390                 395                 400

Gly Gln Asn Ser Ser Ser Asp Ile Lys Gly Asn Ile Thr Ile Lys Ser
                405                 410                 415

Ser Thr Asn Val Thr Leu Lys Ala His Asn Ser Pro Arg Asp Phe Ala
            420                 425                 430

Ser Arg Thr Leu Thr Leu Gly Asn Leu Asn Val Glu Gly Asn Leu Thr
        435                 440                 445

Leu Thr Gly Ser Val Ala Asp Ile Lys Gly Asn Leu Ser Ile Leu Asn
    450                 455                 460

Asp Ala Thr Phe Lys Gly Glu Thr Ser Glu Asn Leu Asn Ile Thr Gly
465                 470                 475                 480

Asn Phe Thr Asn Asn Gly Thr Ala Asp Ile Asn Ile Lys Gln Gly Val
                485                 490                 495

Val Asn Ile Gln Gly Asn Ile Thr Asn Lys Gly Gly Leu Asn Ile Thr
            500                 505                 510

Thr Asn Ala Gln Asn Asn Gln Lys Thr Ile Ile Asn Gly Asn Ile Thr
        515                 520                 525

Asn Glu Gly Gly Asp Leu Asn Ile Lys Asp Ser Asn Asn Asn Ala Glu
    530                 535                 540

Ile Gln Ile Gly Gly Asn Ile Ser Gln Lys Lys Gly Asn Leu Thr Ile
545                 550                 555                 560

Ser Ser Asp Lys Ile Asn Ile Thr Lys Lys Ile Thr Ile Lys Ala Gly
                565                 570                 575

Val Asp Glu Gly Gly Ser Asp Ser Ser Pro Ala Ser Asn Ala Asn Leu
            580                 585                 590
```

Thr Ile Lys Thr Lys Thr Leu Glu Leu Thr Gly Asp Leu Asn Ile Ser
595 600 605

Gly Phe Asn Lys Ala Glu Ile Thr Ala Lys Asn Gly Asn Asp Leu Thr
610 615 620

Ile Gly Lys Ala Ser Asp Gly Asn Ala Asn Ala Lys Lys Val Thr Phe
625 630 635 640

Asp Lys Val Lys Asp Ser Lys Ile Ser Ala Asn Gly His Asn Val Thr
645 650 655

Leu Asn Ser Lys Val Glu Thr Ser Asn Ser Asp Ser Ser Ala Asp Asp
660 665 670

Ser Asn Asp Asn Asn Thr Gly Leu Thr Ile Ser Ala Lys Asp Val Thr
675 680 685

Val Asn Asn Asp Val Thr Ser His Lys Thr Ile Asn Ile Ser Ala Thr
690 695 700

Thr Gly Asn Val Thr Thr Lys Glu Ser Thr Thr Ile Asn Ala Ala Thr
705 710 715 720

Gly Ser Val Glu Val Thr Ala Lys Thr Gly Asp Ile Ser Gly Thr Ile
725 730 735

Ser Gly Asn Thr Val Asn Val Thr Ala Thr Asp Ser Leu Thr Thr Gln
740 745 750

Ala Ser Ser Ser Ile Thr Ser Ser Asn Gly Gln Thr Thr Leu Thr Ala
755 760 765

Lys Asn Gly Ser Ile Ala Gly Ser Ile Asp Ala Ala Asn Val Thr Leu
770 775 780

Asn Thr Thr Gly Thr Leu Thr Thr Val Ala Gly Ser Asn Ile Lys Ala
785 790 795 800

Thr Ser Gly Thr Leu Ala Ile Asn Ala Lys Asp Ala Lys Leu Asp Gly
805 810 815

Thr Ala Ser Gly Asp Arg Thr Val Val Asn Ala Thr Asn Ala Ser Gly
820 825 830

Ser Gly Ser Val Thr Ala Ala Thr Ser Ser Asn Val Asn Ile Thr Gly
835 840 845

Asp Leu Ser Thr Ile Asn Gly Leu Asn Ile Ile Ser Lys Asn Gly Lys
850 855 860

Asn Thr Val Val Leu Lys Gly Ala Glu Ile Asp Val Lys Tyr Ile Gln
865 870 875 880

Pro Gly Val Ala Ser Ala Asn Glu Val Ile Glu Ala Lys Arg Ala Leu
885 890 895

Glu Lys Val Lys Asp Leu Ser Asp Glu Glu Arg Glu Thr Leu Ala Lys

900 905 910

Leu Gly Val Ser Ala Val Arg Phe Val Glu Pro Asn Asn Thr Ile Thr
915 920 925

Val Asn Thr Gln Asn Glu Phe Thr Thr Arg Pro Ser Ser Gln Val Thr
930 935 940

Ile Ser Glu Asp Lys Ala Cys Phe Ser Ser Gly Asn Gly Ala Ala Val
945 950 955 960

Cys Thr Asn Val Thr Asp Asp Arg Gln
965

<210> 33
<211> 3686
<212> DNA
<213> Haemophilus influenzae

<400> 33
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ccatccctaa gtacactaac aaacacaaca cttgagagaa tattaaaaag aaacacctct 180
gttaatatca ctgccaccaa aacaatcaca gttaatagtg atatcaatat tggagacagc 240
tcccacttaa ccctttggag tgagggtcag gggagaggcg gcgttaatgt tacaggcaat 300
attacttcta ctaccaacgg aaacttaacc atttactctg gcggatgggt tgatgttcat 360
aaaaacatta cacttaaatc agggtactta aacattacaa ctaaacaagg agacatcgcc 420
ttcgaagaca aaccagggct gagcaaccta accattacag ctaaagggac cattgccgtg 480
aacaacaaga aaggctttag gtttgataat gtcactctaa atggaacggg aggagggctc 540
tcttttaaat acatcgaaac cggaaataga gatagcaatt tcgaaaccca ttttagagga 600
agattaaata tttcagggaa agtagatatc ttaatgcaag caaggcagga gaactggaac 660
cgcagacact ggggacgctc ccactggaat gtaacccgat tgaacgtttc tgaaaacagt 720
tattttaacg tcactattga tagcagtggc agtgcctctt cccctggcgc tggccctctg 780
aatgcccaat cgggtttaaa tggcatatcg tttaataatg acactgtttt taatattgca 840
gcaagttcgg cggttaactt taacatcaaa ccaccaatag tagacaaagt aaccaacggg 900
aatcacacat tattcaaagg gaatatttca gttttagggg gggggatgtc aactttcatt 960
ttaacgcctc ctccagcaac taccagactt atggcgtgat tatagagtca caaaacttta 1020
gtgcctcagg agggtcaagc ttaaaattca aaagcgaagg ttcgacacac gccgctttta 1080
caataaaaaa tgatttaatt ttaaatgcca ctgggggcaa tatatcattg aaccaagttg 1140
caggtattga tagtaatctc aaaaaaagcc ttatagccaa taaaaacata acctttgaag 1200
ggggcaatat cacccttgca gccgataaaa aaccaataga aatcaaaggt aatattactg 1260
ttaaagaagg agccaatgtc acccttcgta gcgcgaatta tggtaatgac aaatcagctt 1320
taagtataag aggaaatgtc actaataaag gcaatctcac cgttaccggc tccgctatca 1380
atatagaaaa aaatcttacc gttgaaggta gtgctaagtt tttagctaat ccaaattaca 1440
gctttaacgt atccggccta tttgacaacc aaggcaagtc aaacatttcc atcgctaagg 1500
gaggagctat ttttaaagat atcgagaata ctggcagtct gaatattacc actaaatccg 1560
actccaacca ccatactatt ataaagggta atataactaa cagaaaaggt gatttaaata 1620
tcacgaataa tggtgataat actgaaatcc aaattggcgg caatatctcg caaaaagaag 1680
gcaatctcac aatttcttct gataaagtca atattaccga gcggataaca atcaaagcag 1740
gcgttaatgg ggataactct gattcaaatg aggcaacaag tgctaaccta accattaaaa 1800
ccaaagagtt aaaattaaca aacgacctaa atatttcagg ttttaataaa gcagaaatta 1860
cagctaaaga taacagtaat ttaactattg gcgataacag tgacgctggc aatactgacg 1920
ctaaaaaagt aacctttagc aatgttaaag attcaaaaat ctctgctagc gaccataatg 1980
taacgctaaa cagcaaagtg gaaacatctg gcgatactga cagcactgaa gatggcggca 2040
acaataacac cggcttaact attactgcaa aaaatgtaac agtaaacaac aatattactt 2100
ctcacaaaac agtaaatatc actgcgtcag aaaatgttac caccaaagcg ggcacaacca 2160
ttaatgcaac cacaggtagc gtagaagtaa cagccaaaac aggtgatatt aaaggtggaa 2220
ttgaatccaa ttccggtaat gtaaatatta cagcgagcgg cgacacgctt aatgtaagta 2280

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acatcacagg tcaaaatgtg acagtggcag cagcctcagg tgccgtaaca accacaaaag 2340
gatcaactat taatgcaaca actggtaatg caaatattac aaccaaaaca ggtgaaatta 2400
atggcgaagt taaatcagct tccggtaatg taaatattac agcgagcggc aatacactta 2460
atgtaagtaa catcactggt caaaatgtaa cagtaacagc aaactcaggt gccataacaa 2520
ccacagaagg ctcaactatt aacgcgacaa caggtgatgc aaatattaca acccaaacag 2580
gtaatattaa tggtaaagtt gaatccagtt ctggttctgt gacgcttatt gcaactggac 2640
aaactcttgc tgtaggtaat atttcaggtg acactgttac cattactgcg gataaaggta 2700
aattaaccac acaaacaagc tctaagatta acggaactaa gagtgtaacc acctcaagcc 2760
aatcaggtga tattagtggc acaatttctg gtaatacggt aagcgttagt gcgaccggta 2820
gcttgaccac tcaagcaggc tcaaaaattg aagcaaaaac aggtgaggct aatgtaacaa 2880
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ctgataattt aactattaaa gatggcgcaa gaattaaagc aacgggcgga gctgtgactt 3000
taaccgcaac aggaggtact ttaaccaccg aaacaagttc tgatattacc tcaagcaatg 3060
gtcagacaac tctcacggcc aaggatagca gtatcgcagg aagcatcaat gccgccaatg 3120
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tatctgacga agaaagagaa acattagcta aacttggcgt gagcgctgta cgttttgctg 3540
agccaaataa tgccattacg attaatacac aaaatgagtt tacaaccaga ccattaagtc 3600
aagtgacaat ttctgaaggt aaggtatgtt tcttaatcgg caatggcgca acaatatgca 3660
ccaatattgc tgatattgag cggtag                                     3686
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<210> 34
<211> 1228
<212> PRT
<213> Haemophilus influenzae

<400> 34

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Lys Glu Trp Leu Leu Asp Pro Asp Asn Val Ser Ile Asn Ala Pro Ala
  1               5                  10                  15

Leu Gly Arg Thr Glu Ser Thr Pro Asn Asn Asn Glu Tyr Asp Ser Pro
             20                  25                  30

Asn Gln Ile Asn Tyr Lys Asn Lys Pro Ser Leu Ser Thr Leu Thr Asn
         35                  40                  45

Thr Thr Leu Glu Arg Ile Leu Lys Arg Asn Thr Ser Val Asn Ile Thr
     50                  55                  60

Ala Thr Lys Thr Ile Thr Val Asn Ser Asp Ile Asn Ile Gly Asp Ser
 65                  70                  75                  80

Ser His Leu Thr Leu Trp Ser Glu Gly Gln Gly Arg Gly Gly Val Asn
                 85                  90                  95

Val Thr Gly Asn Ile Thr Ser Thr Thr Asn Gly Asn Leu Thr Ile Tyr
            100                 105                 110

Ser Gly Gly Trp Val Asp Val His Lys Asn Ile Thr Leu Lys Ser Gly
        115                 120                 125

Tyr Leu Asn Ile Thr Thr Lys Gln Gly Asp Ile Ala Phe Glu Asp Lys
    130                 135                 140
```

```
Pro Gly Leu Ser Asn Leu Thr Ile Thr Ala Lys Gly Thr Ile Ala Val
145                 150                 155                 160

Asn Asn Lys Lys Gly Phe Arg Phe Asp Asn Val Thr Leu Asn Gly Thr
                165                 170                 175

Gly Gly Gly Leu Ser Phe Lys Tyr Ile Glu Thr Gly Asn Arg Asp Ser
            180                 185                 190

Asn Phe Glu Thr His Phe Arg Gly Arg Leu Asn Ile Ser Gly Lys Val
        195                 200                 205

Asp Ile Leu Met Gln Ala Arg Gln Glu Asn Trp Asn Arg Arg His Trp
    210                 215                 220

Gly Arg Ser His Trp Asn Val Thr Arg Leu Asn Val Ser Glu Asn Ser
225                 230                 235                 240

Tyr Phe Asn Val Thr Ile Asp Ser Ser Gly Ser Ala Ser Ser Pro Gly
                245                 250                 255

Ala Gly Pro Leu Asn Ala Gln Ser Gly Leu Asn Gly Ile Ser Phe Asn
            260                 265                 270

Asn Asp Thr Val Phe Asn Ile Ala Ala Ser Ser Ala Val Asn Phe Asn
        275                 280                 285

Ile Lys Pro Pro Ile Val Asp Lys Val Thr Asn Gly Asn His Thr Leu
    290                 295                 300

Phe Lys Gly Asn Ile Ser Val Leu Gly Gly Gly Met Ser Thr Phe Ile
305                 310                 315                 320

Phe Asn Ala Ser Ser Ser Asn Tyr Gln Thr Tyr Gly Val Ile Ile Glu
                325                 330                 335

Ser Gln Asn Phe Ser Ala Ser Gly Gly Ser Ser Leu Lys Phe Lys Ser
            340                 345                 350

Glu Gly Ser Thr His Ala Ala Phe Thr Ile Lys Asn Asp Leu Ile Leu
        355                 360                 365

Asn Ala Thr Gly Gly Asn Ile Ser Leu Asn Gln Val Ala Gly Ile Asp
    370                 375                 380

Ser Asn Leu Lys Lys Ser Leu Ile Ala Asn Lys Asn Ile Thr Phe Glu
385                 390                 395                 400

Gly Gly Asn Ile Thr Leu Ala Ala Asp Lys Lys Pro Ile Glu Ile Lys
                405                 410                 415

Gly Asn Ile Thr Val Lys Glu Gly Ala Asn Val Thr Leu Arg Ser Ala
            420                 425                 430

Asn Tyr Gly Asn Asp Lys Ser Ala Leu Ser Ile Arg Gly Asn Val Thr
        435                 440                 445

Asn Lys Gly Asn Leu Thr Val Thr Gly Ser Ala Ile Asn Ile Glu Lys
    450                 455                 460
```

```
Asn Leu Thr Val Glu Gly Ser Ala Lys Phe Leu Ala Asn Pro Asn Tyr
465                 470                 475                 480

Ser Phe Asn Val Ser Gly Leu Phe Asp Asn Gln Gly Lys Ser Asn Ile
                485                 490                 495

Ser Ile Ala Lys Gly Gly Ala Ile Phe Lys Asp Ile Glu Asn Thr Gly
            500                 505                 510

Ser Leu Asn Ile Thr Thr Lys Ser Asp Ser Asn His His Thr Ile Ile
        515                 520                 525

Lys Gly Asn Ile Thr Asn Arg Lys Gly Asp Leu Asn Ile Thr Asn Asn
    530                 535                 540

Gly Asp Asn Thr Glu Ile Gln Ile Gly Gly Asn Ile Ser Gln Lys Glu
545                 550                 555                 560

Gly Asn Leu Thr Ile Ser Ser Asp Lys Val Asn Ile Thr Glu Arg Ile
                565                 570                 575

Thr Ile Lys Ala Gly Val Asn Gly Asp Asn Ser Asp Ser Asn Glu Ala
            580                 585                 590

Thr Ser Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Lys Leu Thr Asn
        595                 600                 605

Asp Leu Asn Ile Ser Gly Phe Asn Lys Ala Glu Ile Thr Ala Lys Asp
    610                 615                 620

Asn Ser Asn Leu Thr Ile Gly Asp Asn Ser Asp Ala Gly Asn Thr Asp
625                 630                 635                 640

Ala Lys Lys Val Thr Phe Ser Asn Val Lys Asp Ser Lys Ile Ser Ala
                645                 650                 655

Ser Asp His Asn Val Thr Leu Asn Ser Lys Val Glu Thr Ser Gly Asp
            660                 665                 670

Thr Asp Ser Thr Glu Asp Gly Gly Asn Asn Asn Thr Gly Leu Thr Ile
        675                 680                 685

Thr Ala Lys Asn Val Thr Val Asn Asn Asn Ile Thr Ser His Lys Thr
    690                 695                 700

Val Asn Ile Thr Ala Ser Glu Asn Val Thr Thr Lys Ala Gly Thr Thr
705                 710                 715                 720

Ile Asn Ala Thr Thr Gly Ser Val Glu Val Thr Ala Lys Thr Gly Asp
                725                 730                 735

Ile Lys Gly Gly Ile Glu Ser Asn Ser Gly Asn Val Asn Ile Thr Ala
            740                 745                 750

Ser Gly Asp Thr Leu Asn Val Ser Asn Ile Thr Gly Gln Asn Val Thr
        755                 760                 765

Val Ala Ala Ala Ser Gly Ala Val Thr Thr Thr Lys Gly Ser Thr Ile
```

```
    770                 775                 780

Asn Ala Thr Thr Gly Asn Ala Asn Ile Thr Thr Lys Thr Gly Glu Ile
785                 790                 795                 800

Asn Gly Glu Val Lys Ser Ala Ser Gly Asn Val Asn Ile Thr Ala Ser
                805                 810                 815

Gly Asn Thr Leu Asn Val Ser Asn Ile Thr Gly Gln Asn Val Thr Val
            820                 825                 830

Thr Ala Asn Ser Gly Ala Ile Thr Thr Thr Glu Gly Ser Thr Ile Asn
        835                 840                 845

Ala Thr Thr Gly Asp Ala Asn Ile Thr Thr Gln Thr Gly Asn Ile Asn
    850                 855                 860

Gly Lys Val Glu Ser Ser Ser Gly Ser Val Thr Leu Ile Ala Thr Gly
865                 870                 875                 880

Gln Thr Leu Ala Val Gly Asn Ile Ser Gly Asp Thr Val Thr Ile Thr
                885                 890                 895

Ala Asp Lys Gly Lys Leu Thr Thr Gln Thr Ser Ser Lys Ile Asn Gly
            900                 905                 910

Thr Lys Ser Val Thr Thr Ser Ser Gln Ser Gly Asp Ile Ser Gly Thr
        915                 920                 925

Ile Ser Gly Asn Thr Val Ser Val Ser Ala Thr Gly Ser Leu Thr Thr
    930                 935                 940

Gln Ala Gly Ser Lys Ile Glu Ala Lys Thr Gly Glu Ala Asn Val Thr
945                 950                 955                 960

Ser Ala Thr Gly Thr Ile Gly Gly Thr Ile Ser Gly Asn Thr Val Asn
                965                 970                 975

Val Thr Ala Asn Thr Asp Asn Leu Thr Ile Lys Asp Gly Ala Arg Ile
            980                 985                 990

Lys Ala Thr Gly Gly Ala Val Thr Leu Thr Ala Thr Gly Gly Thr Leu
        995                1000                1005

Thr Thr Glu Thr Ser Ser Asp Ile Thr Ser Ser Asn Gly Gln Thr Thr
   1010                1015                1020

Leu Thr Ala Lys Asp Ser Ser Ile Ala Gly Ser Ile Asn Ala Ala Asn
1025                1030                1035                1040

Val Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Val Ala Gly Ser Lys
                1045                1050                1055

Ile Glu Ala Ala Ser Gly Thr Leu Val Ile Asn Ala Lys Asp Ala Gln
            1060                1065                1070

Leu Asp Gly Ala Ala Ser Gly Asp His Thr Val Val Asn Ala Thr Asn
        1075                1080                1085
```

```
Ala Asn Gly Ser Gly Ser Val Ile Ala Thr Thr Ser Ser Arg Val Asn
   1090                1095                1100

Ile Thr Gly Asp Leu Ile Thr Ile Asn Gly Leu Asn Ile Ile Ser Lys
1105                1110                1115                1120

Asn Gly Lys Asn Thr Val Leu Leu Lys Gly Val Glu Ile Asp Val Lys
               1125                1130                1135

Tyr Ile Gln Pro Gly Ile Ala Ser Val Asn Glu Val Ile Glu Ala Lys
           1140                1145                1150

Arg Ala Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu Arg Glu Thr
       1155                1160                1165

Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Ala Glu Pro Asn Asn
   1170                1175                1180

Ala Ile Thr Ile Asn Thr Gln Asn Glu Phe Thr Thr Arg Pro Leu Ser
1185                1190                1195                1200

Gln Val Thr Ile Ser Glu Gly Lys Val Cys Phe Leu Ile Gly Asn Gly
               1205                1210                1215

Ala Thr Ile Cys Thr Asn Ile Ala Asp Ile Glu Arg
           1220                1225
```

<210> 35
<211> 915
<212> PRT
<213> Haemophilus influenzae

<400> 35

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Gly Gly Asp Val Asn Phe His Phe Asn Ala Ser Ser Ser Asn Tyr Gln
  1               5                  10                  15

Thr Tyr Gly Val Ile Ile Glu Ser Gln Asn Phe Ser Ala Ser Gly Gly
             20                  25                  30

Ser Ser Leu Lys Phe Lys Ser Glu Gly Ser Thr His Ala Ala Phe Thr
         35                  40                  45

Ile Lys Asn Asp Leu Ile Leu Asn Ala Thr Gly Gly Asn Ile Ser Leu
     50                  55                  60

Asn Gln Val Ala Gly Ile Asp Ser Asn Leu Lys Lys Ser Leu Ile Ala
 65                  70                  75                  80

Asn Lys Asn Ile Thr Phe Glu Gly Gly Asn Ile Thr Leu Ala Ala Asp
                 85                  90                  95

Lys Lys Pro Ile Glu Ile Lys Gly Asn Ile Thr Val Lys Glu Gly Ala
            100                 105                 110

Asn Val Thr Leu Arg Ser Ala Asn Tyr Gly Asn Asp Lys Ser Ala Leu
        115                 120                 125

Ser Ile Arg Gly Asn Val Thr Asn Lys Gly Asn Leu Thr Val Thr Gly
```

```
    130                 135                 140

Ser Ala Ile Asn Ile Glu Lys Asn Leu Thr Val Glu Gly Ser Ala Lys
145                 150                 155                 160

Phe Leu Ala Asn Pro Asn Tyr Ser Phe Asn Val Ser Gly Leu Phe Asp
                165                 170                 175

Asn Gln Gly Lys Ser Asn Ile Ser Ile Ala Lys Gly Gly Ala Ile Phe
            180                 185                 190

Lys Asp Ile Glu Asn Thr Gly Ser Leu Asn Ile Thr Thr Lys Ser Asp
        195                 200                 205

Ser Asn His His Thr Ile Ile Lys Gly Asn Ile Thr Asn Arg Lys Gly
    210                 215                 220

Asp Leu Asn Ile Thr Asn Asn Gly Asp Asn Thr Glu Ile Gln Ile Gly
225                 230                 235                 240

Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp Lys
                245                 250                 255

Val Asn Ile Thr Glu Arg Ile Thr Ile Lys Ala Gly Val Asn Gly Asp
            260                 265                 270

Asn Ser Asp Ser Asn Glu Ala Thr Ser Ala Asn Leu Thr Ile Lys Thr
        275                 280                 285

Lys Glu Leu Lys Leu Thr Asn Asp Leu Asn Ile Ser Gly Phe Asn Lys
    290                 295                 300

Ala Glu Ile Thr Ala Lys Asp Asn Ser Asn Leu Thr Ile Gly Asp Asn
305                 310                 315                 320

Ser Asp Ala Gly Asn Thr Asp Ala Lys Lys Val Thr Phe Ser Asn Val
                325                 330                 335

Lys Asp Ser Lys Ile Ser Ala Ser Asp His Asn Val Thr Leu Asn Ser
            340                 345                 350

Lys Val Glu Thr Ser Gly Asp Thr Asp Ser Thr Glu Asp Gly Gly Asn
        355                 360                 365

Asn Asn Thr Gly Leu Thr Ile Thr Ala Lys Asn Val Thr Val Asn Asn
    370                 375                 380

Asn Ile Thr Ser His Lys Thr Val Asn Ile Thr Ala Ser Glu Asn Val
385                 390                 395                 400

Thr Thr Lys Ala Gly Thr Thr Ile Asn Ala Thr Thr Gly Ser Val Glu
                405                 410                 415

Val Thr Ala Lys Thr Gly Asp Ile Lys Gly Gly Ile Glu Ser Asn Ser
            420                 425                 430

Gly Asn Val Asn Ile Thr Ala Ser Gly Asp Thr Leu Asn Val Ser Asn
        435                 440                 445
```

```
Ile Thr Gly Gln Asn Val Thr Val Ala Ala Ala Ser Gly Ala Val Thr
    450                 455                 460

Thr Thr Lys Gly Ser Thr Ile Asn Ala Thr Thr Gly Asn Ala Asn Ile
465                 470                 475                 480

Thr Thr Lys Thr Gly Glu Ile Asn Gly Glu Val Lys Ser Ala Ser Gly
                485                 490                 495

Asn Val Asn Ile Thr Ala Ser Gly Asn Thr Leu Asn Val Ser Asn Ile
            500                 505                 510

Thr Gly Gln Asn Val Thr Val Thr Ala Asn Ser Gly Ala Ile Thr Thr
        515                 520                 525

Thr Glu Gly Ser Thr Ile Asn Ala Thr Thr Gly Asp Ala Asn Ile Thr
    530                 535                 540

Thr Gln Thr Gly Asn Ile Asn Gly Lys Val Glu Ser Ser Ser Gly Ser
545                 550                 555                 560

Val Thr Leu Ile Ala Thr Gly Gln Thr Leu Ala Val Gly Asn Ile Ser
                565                 570                 575

Gly Asp Thr Val Thr Ile Thr Ala Asp Lys Gly Lys Leu Thr Thr Gln
            580                 585                 590

Thr Ser Ser Lys Ile Asn Gly Thr Lys Ser Val Thr Thr Ser Ser Gln
        595                 600                 605

Ser Gly Asp Ile Ser Gly Thr Ile Ser Gly Asn Thr Val Ser Val Ser
    610                 615                 620

Ala Thr Gly Ser Leu Thr Thr Gln Ala Gly Ser Lys Ile Glu Ala Lys
625                 630                 635                 640

Thr Gly Glu Ala Asn Val Thr Ser Ala Thr Gly Thr Ile Gly Gly Thr
                645                 650                 655

Ile Ser Gly Asn Thr Val Asn Val Thr Ala Asn Thr Asp Asn Leu Thr
            660                 665                 670

Ile Lys Asp Gly Ala Arg Ile Lys Ala Thr Gly Gly Ala Val Thr Leu
        675                 680                 685

Thr Ala Thr Gly Gly Thr Leu Thr Thr Glu Thr Ser Ser Asp Ile Thr
    690                 695                 700

Ser Ser Asn Gly Gln Thr Thr Leu Thr Ala Lys Asp Ser Ser Ile Ala
705                 710                 715                 720

Gly Ser Ile Asn Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Thr Leu
                725                 730                 735

Thr Thr Val Ala Gly Ser Lys Ile Glu Ala Ala Ser Gly Thr Leu Val
            740                 745                 750

Ile Asn Ala Lys Asp Ala Gln Leu Asp Gly Ala Ala Ser Gly Asp His
        755                 760                 765
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Thr Val Val Asn Ala Thr Asn Ala Asn Gly Ser Gly Ser Val Ile Ala
    770                 775                 780

Thr Thr Ser Ser Arg Val Asn Ile Thr Gly Asp Leu Ile Thr Ile Asn
785                 790                 795                 800

Gly Leu Asn Ile Ile Ser Lys Asn Gly Lys Asn Thr Val Leu Leu Lys
                805                 810                 815

Gly Val Glu Ile Asp Val Lys Tyr Ile Gln Pro Gly Ile Ala Ser Val
            820                 825                 830

Asn Glu Val Ile Glu Ala Lys Arg Ala Leu Glu Lys Val Lys Asp Leu
        835                 840                 845

Ser Asp Glu Glu Arg Glu Thr Leu Ala Lys Leu Gly Val Ser Ala Val
    850                 855                 860

Arg Phe Ala Glu Pro Asn Asn Ala Ile Thr Ile Asn Thr Gln Asn Glu
865                 870                 875                 880

Phe Thr Thr Arg Pro Leu Ser Gln Val Thr Ile Ser Glu Gly Lys Val
                885                 890                 895

Cys Phe Leu Ile Gly Asn Gly Ala Thr Ile Cys Thr Asn Ile Ala Asp
            900                 905                 910

Ile Glu Arg
        915
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<210> 36
<211> 3668
<212> DNA
<213> Haemophilus influenzae

<400> 36

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acaaacacaa cacttgagag aatattaaaa agaaacacct ctgttaatat cactgccacc 180
aaaacaatca cagttaatag tgatatcaat attggagaca gctcccactt aacccttgg 240
agtgagggtc aggggagagg cggcgttaat gttacaggca atattacttc tactaccaac 300
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ctgagcaacc taaccattac agctaaaggg accattgccg tgaacaacaa gaaaggcttt 480
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tcccactgga atgtaacccg attgaacgtt tctgaaaaca gttattttaa cgtcactatt 720
gatagcagtg gcagtgcctc ttcccctggc gctggccctc tgaatgccca atcgggttta 780
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cagccgataa aaaaccaata gaaatcaaag gtaatattac tgttaaagaa ggagccaatg 1260
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cgattaatac acaaaatgag tttacaacca gaccattaag tcaagtgaca atttctgaag 3600
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agcggtag 3668

<210> 37
<211> 1222
<212> PRT
<213> Haemophilus influenzae

<400> 37
Pro Asp Asn Val Ser Ile Asn Ala Pro Ala Leu Gly Arg Thr Glu Ser
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Thr Pro Asn Asn Asn Glu Tyr Asp Ser Pro Asn Gln Ile Asn Tyr Lys
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Asn Lys Pro Ser Leu Ser Thr Leu Thr Asn Thr Thr Leu Glu Arg Ile
35 40 45

Leu Lys Arg Asn Thr Ser Val Asn Ile Thr Ala Thr Lys Thr Ile Thr

```
     50                  55                  60

Val Asn Ser Asp Ile Asn Ile Gly Asp Ser Ser His Leu Thr Leu Trp
 65                  70                  75                  80

Ser Glu Gly Gln Gly Arg Gly Gly Val Asn Val Thr Gly Asn Ile Thr
                85                  90                  95

Ser Thr Thr Asn Gly Asn Leu Thr Ile Tyr Ser Gly Gly Trp Val Asp
            100                 105                 110

Val His Lys Asn Ile Thr Leu Lys Ser Gly Tyr Leu Asn Ile Thr Thr
        115                 120                 125

Lys Gln Gly Asp Ile Ala Phe Glu Asp Lys Pro Gly Leu Ser Asn Leu
    130                 135                 140

Thr Ile Thr Ala Lys Gly Thr Ile Ala Val Asn Asn Lys Lys Gly Phe
145                 150                 155                 160

Arg Phe Asp Asn Val Thr Leu Asn Gly Thr Gly Gly Gly Leu Ser Phe
                165                 170                 175

Lys Tyr Ile Glu Thr Gly Asn Arg Asp Ser Asn Phe Glu Thr His Phe
            180                 185                 190

Arg Gly Arg Leu Asn Ile Ser Gly Lys Val Asp Ile Leu Met Gln Ala
        195                 200                 205

Arg Gln Glu Asn Trp Asn Arg Arg His Trp Gly Arg Ser His Trp Asn
    210                 215                 220

Val Thr Arg Leu Asn Val Ser Glu Asn Ser Tyr Phe Asn Val Thr Ile
225                 230                 235                 240

Asp Ser Ser Gly Ser Ala Ser Ser Pro Gly Ala Gly Pro Leu Asn Ala
                245                 250                 255

Gln Ser Gly Leu Asn Gly Ile Ser Phe Asn Asn Asp Thr Val Phe Asn
            260                 265                 270

Ile Ala Ala Ser Ser Ala Val Asn Phe Asn Ile Lys Pro Pro Ile Val
        275                 280                 285

Asp Lys Val Thr Asn Gly Asn His Thr Leu Phe Lys Gly Asn Ile Ser
    290                 295                 300

Val Leu Gly Gly Gly Met Ser Thr Phe Ile Phe Asn Ala Ser Ser Ser
305                 310                 315                 320

Asn Tyr Gln Thr Tyr Gly Val Ile Ile Glu Ser Gln Asn Phe Ser Ala
                325                 330                 335

Ser Gly Gly Ser Ser Leu Lys Phe Lys Ser Glu Gly Ser Thr His Ala
            340                 345                 350

Ala Phe Thr Ile Lys Asn Asp Leu Ile Leu Asn Ala Thr Gly Gly Asn
        355                 360                 365
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Ile Ser Leu Asn Gln Val Ala Gly Ile Asp Ser Asn Leu Lys Lys Ser
    370                 375                 380

Leu Ile Ala Asn Lys Asn Ile Thr Phe Glu Gly Gly Asn Ile Thr Leu
385                 390                 395                 400

Ala Ala Asp Lys Lys Pro Ile Glu Ile Lys Gly Asn Ile Thr Val Lys
                405                 410                 415

Glu Gly Ala Asn Val Thr Leu Arg Ser Ala Asn Tyr Gly Asn Asp Lys
            420                 425                 430

Ser Ala Leu Ser Ile Arg Gly Asn Val Thr Asn Lys Gly Asn Leu Thr
        435                 440                 445

Val Thr Gly Ser Ala Ile Asn Ile Glu Lys Asn Leu Thr Val Glu Gly
    450                 455                 460

Ser Ala Lys Phe Leu Ala Asn Pro Asn Tyr Ser Phe Asn Val Ser Gly
465                 470                 475                 480

Leu Phe Asp Asn Gln Gly Lys Ser Asn Ile Ser Ile Ala Lys Gly Gly
                485                 490                 495

Ala Ile Phe Lys Asp Ile Glu Asn Thr Gly Ser Leu Asn Ile Thr Thr
            500                 505                 510

Lys Ser Asp Ser Asn His His Thr Ile Ile Lys Gly Asn Ile Thr Asn
        515                 520                 525

Arg Lys Gly Asp Leu Asn Ile Thr Asn Asn Gly Asp Asn Thr Glu Ile
    530                 535                 540

Gln Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile Ser
545                 550                 555                 560

Ser Asp Lys Val Asn Ile Thr Glu Arg Ile Thr Ile Lys Ala Gly Val
                565                 570                 575

Asn Gly Asp Asn Ser Asp Ser Asn Glu Ala Thr Ser Ala Asn Leu Thr
            580                 585                 590

Ile Lys Thr Lys Glu Leu Lys Leu Thr Asn Asp Leu Asn Ile Ser Gly
        595                 600                 605

Phe Asn Lys Ala Glu Ile Thr Ala Lys Asp Asn Ser Asn Leu Thr Ile
    610                 615                 620

Gly Asp Asn Ser Asp Ala Gly Asn Thr Asp Ala Lys Lys Val Thr Phe
625                 630                 635                 640

Ser Asn Val Lys Asp Ser Lys Ile Ser Ala Ser Asp His Asn Val Thr
                645                 650                 655

Leu Asn Ser Lys Val Glu Thr Ser Gly Asp Thr Asp Ser Thr Glu Asp
            660                 665                 670

Gly Gly Asn Asn Asn Thr Gly Leu Thr Ile Thr Ala Lys Asn Val Thr
        675                 680                 685
```

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Val Asn Asn Asn Ile Thr Ser His Lys Thr Val Asn Ile Thr Ala Ser
    690                 695                 700

Glu Asn Val Thr Thr Lys Ala Gly Thr Thr Ile Asn Ala Thr Thr Gly
705                 710                 715                 720

Ser Val Glu Val Thr Ala Lys Thr Gly Asp Ile Lys Gly Gly Ile Glu
                725                 730                 735

Ser Asn Ser Gly Asn Val Asn Ile Thr Ala Ser Gly Asp Thr Leu Asn
            740                 745                 750

Val Ser Asn Ile Thr Gly Gln Asn Val Thr Val Ala Ala Ala Ser Gly
        755                 760                 765

Ala Val Thr Thr Thr Lys Gly Ser Thr Ile Asn Ala Thr Thr Gly Asn
    770                 775                 780

Ala Asn Ile Thr Thr Lys Thr Gly Glu Ile Asn Gly Glu Val Lys Ser
785                 790                 795                 800

Ala Ser Gly Asn Val Asn Ile Thr Ala Ser Gly Asn Thr Leu Asn Val
                805                 810                 815

Ser Asn Ile Thr Gly Gln Asn Val Thr Val Thr Ala Asn Ser Gly Ala
            820                 825                 830

Ile Thr Thr Thr Glu Gly Ser Thr Ile Asn Ala Thr Thr Gly Asp Ala
        835                 840                 845

Asn Ile Thr Thr Gln Thr Gly Asn Ile Asn Gly Lys Val Glu Ser Ser
    850                 855                 860

Ser Gly Ser Val Thr Leu Ile Ala Thr Gly Gln Thr Leu Ala Val Gly
865                 870                 875                 880

Asn Ile Ser Gly Asp Thr Val Thr Ile Thr Ala Asp Lys Gly Lys Leu
                885                 890                 895

Thr Thr Gln Thr Ser Ser Lys Ile Asn Gly Thr Lys Ser Val Thr Thr
            900                 905                 910

Ser Ser Gln Ser Gly Asp Ile Ser Gly Thr Ile Ser Gly Asn Thr Val
        915                 920                 925

Ser Val Ser Ala Thr Gly Ser Leu Thr Thr Gln Ala Gly Ser Lys Ile
    930                 935                 940

Glu Ala Lys Thr Gly Glu Ala Asn Val Thr Ser Ala Thr Gly Thr Ile
945                 950                 955                 960

Gly Gly Thr Ile Ser Gly Asn Thr Val Asn Val Thr Ala Asn Thr Asp
                965                 970                 975

Asn Leu Thr Ile Lys Asp Gly Ala Arg Ile Lys Ala Thr Gly Gly Ala
            980                 985                 990

Val Thr Leu Thr Ala Thr Gly Gly Thr Leu Thr Thr Glu Thr Ser Ser
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995 1000 1005

Asp Ile Thr Ser Ser Asn Gly Gln Thr Thr Leu Thr Ala Lys Asp Ser
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Ser Ile Ala Gly Ser Ile Asn Ala Ala Asn Val Thr Leu Asn Thr Thr
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Gly Thr Leu Thr Thr Val Ala Gly Ser Lys Ile Glu Ala Ala Ser Gly
1045 1050 1055

Thr Leu Val Ile Asn Ala Lys Asp Ala Gln Leu Asp Gly Ala Ala Ser
1060 1065 1070

Gly Asp His Thr Val Val Asn Ala Thr Asn Ala Asn Gly Ser Gly Ser
1075 1080 1085

Val Ile Ala Thr Thr Ser Ser Arg Val Asn Ile Thr Gly Asp Leu Ile
1090 1095 1100

Thr Ile Asn Gly Leu Asn Ile Ile Ser Lys Asn Gly Lys Asn Thr Val
1105 1110 1115 1120

Leu Leu Lys Gly Val Glu Ile Asp Val Lys Tyr Ile Gln Pro Gly Ile
1125 1130 1135

Ala Ser Val Asn Glu Val Ile Glu Ala Lys Arg Ala Leu Glu Lys Val
1140 1145 1150

Lys Asp Leu Ser Asp Glu Glu Arg Glu Thr Leu Ala Lys Leu Gly Val
1155 1160 1165

Ser Ala Val Arg Phe Ala Glu Pro Asn Asn Ala Ile Thr Ile Asn Thr
1170 1175 1180

Gln Asn Glu Phe Thr Thr Arg Pro Leu Ser Gln Val Thr Ile Ser Glu
1185 1190 1195 1200

Gly Lys Val Cys Phe Leu Ile Gly Asn Gly Ala Thr Ile Cys Thr Asn
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Ile Ala Asp Ile Glu Arg
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<210> 38
<211> 3036
<212> DNA
<213> Haemophilus influenzae

<400> 38
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attaacaatg ccacattatc caccgcttta caaaagggta ttgaggtcaa catttctgcc 180
acaaaaaatg taaccgtcaa cgcggatgtt gatgttaaaa acggaacatt agtattacat 240
tcacaaagga atggagttaa aattaacggt aatattacct caacacaaaa tggtaattta 300
accattaaaa caggtggcaa ggttgatgtt cataaaaata tcacacttgg tatgggtttt 360
ttgaatatta cttccgataa taacatcacc tttgaaaaag gtgataatct aaccattacc 420
gcccaaggaa atataatctc taatcaagag aataaacaac ttagatttag taatgtatct 480

ttaaatggga tgggtgcggg tttaactttt actgcaaata aaggtaatca tacccataag 540
tttgatggca cgcttaacat ttccggaaag gtagtaatta atcaaaccac acctcacaac 600
attgctccat ggaatgcaag tgcagactct tactggaatg taactactct tactttaggt 660
aataatgcgc aatttacctt tattaaattt gtcgatagca accgctcggt agctcttaat 720
agcggttcaa gaagttttgc gggggtaaag ttctacggca agaataatga aatgaaattt 780
aatattggtg ataatgctaa tgttgaattc aagttaaaat caaatgataa tacaagcaac 840
aacaaaccac taccaattca gtttttatct aatatctcag ccactggtaa tggcactgta 900
tcttttgata tacatgccaa cttgtcagca aggtcaactg agttaaatat gagtttaatt 960
aacatttcta atggggttaa tttttccata aactcccatg ttcgcggtaa taatgctttt 1020
gaaatcaaaa aagatttaat tataaatgca actggctcga attttaatct taagcaaacg 1080
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gtatgtacca atgttgctga cgatggacag cagtag 3036

<210> 39
<211> 1011
<212> PRT
<213> Haemophilus influenzae

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Asn Ile Asp Ala Gln Leu Gln Pro Gly Arg Gly Asp Thr Pro Asn Lys
20 25 30

Val Ser Ala Glu Gly Leu Thr Ser Ile Asn Asn Ala Thr Leu Ser Thr
35 40 45

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Ala Leu Gln Lys Gly Ile Glu Val Asn Ile Ser Ala Thr Lys Asn Val
     50                  55                  60

Thr Val Asn Ala Asp Val Asp Val Lys Asn Gly Thr Leu Val Leu His
 65                  70                  75                  80

Ser Gln Arg Asn Gly Val Lys Ile Asn Gly Asn Ile Thr Ser Thr Gln
                85                  90                  95

Asn Gly Asn Leu Thr Ile Lys Thr Gly Gly Lys Val Asp Val His Lys
            100                 105                 110

Asn Ile Thr Leu Gly Met Gly Phe Leu Asn Ile Thr Ser Asp Asn Asn
        115                 120                 125

Ile Thr Phe Glu Lys Gly Asp Asn Leu Thr Ile Thr Ala Gln Gly Asn
    130                 135                 140

Ile Ile Ser Asn Gln Glu Asn Lys Gln Leu Arg Phe Ser Asn Val Ser
145                 150                 155                 160

Leu Asn Gly Met Gly Ala Gly Leu Thr Phe Thr Ala Asn Lys Gly Asn
                165                 170                 175

His Thr His Lys Phe Asp Gly Thr Leu Asn Ile Ser Gly Lys Val Val
            180                 185                 190

Ile Asn Gln Thr Thr Pro His Asn Ile Ala Pro Trp Asn Ala Ser Ala
        195                 200                 205

Asp Ser Tyr Trp Asn Val Thr Thr Leu Thr Leu Gly Asn Asn Ala Gln
    210                 215                 220

Phe Thr Phe Ile Lys Phe Val Asp Ser Asn Arg Ser Val Ala Leu Asn
225                 230                 235                 240

Ser Gly Ser Arg Ser Phe Ala Gly Val Lys Phe Tyr Gly Lys Asn Asn
                245                 250                 255

Glu Met Lys Phe Asn Ile Gly Asp Asn Ala Asn Val Glu Phe Lys Leu
            260                 265                 270

Lys Ser Asn Asp Asn Thr Ser Asn Asn Lys Pro Leu Pro Ile Gln Phe
        275                 280                 285

Leu Ser Asn Ile Ser Ala Thr Gly Asn Gly Thr Val Ser Phe Asp Ile
    290                 295                 300

His Ala Asn Leu Ser Ala Arg Ser Thr Glu Leu Asn Met Ser Leu Ile
305                 310                 315                 320

Asn Ile Ser Asn Gly Val Asn Phe Ser Ile Asn Ser His Val Arg Gly
                325                 330                 335

Asn Asn Ala Phe Glu Ile Lys Lys Asp Leu Ile Ile Asn Ala Thr Gly
            340                 345                 350

Ser Asn Phe Asn Leu Lys Gln Thr Lys Asp Lys Phe Asp Asn Ser Tyr
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355 360 365

Glu Lys Asn Ala Ile Phe Ser Thr His Asn Leu Thr Ile Leu Gly Gly
370 375 380

Asn Val Thr Leu Gly Gly Glu Asn Ser Ser Ser Asn Ile Lys Gly Asn
385 390 395 400

Ile Asn Ile Asn Ser Lys Ala Asn Val Thr Leu Gln Ala His Ala Gly
405 410 415

Thr Ser His Leu Asp Lys Lys Glu Arg Thr Leu Thr Leu Gly Asn Val
420 425 430

Ser Val Gly Gly Asn Leu Asn Ile Ile Gly Ser Asn Ala His Ile Asp
435 440 445

Gly Asn Leu Ser Ile Ala Glu Ser Ala Lys Phe Gln Gly Lys Thr Asn
450 455 460

Asn Asn Leu Asn Ile Thr Gly Thr Phe Thr Asn Asn Gly Thr Ala Asp
465 470 475 480

Ile Asn Ile Lys Gln Gly Val Val Lys Leu Gln Gly Asp Ile Thr Asn
485 490 495

Asn Gly Asn Leu Asn Ile Thr Thr Asn Ala Ser Val Asn Gln Lys Thr
500 505 510

Ile Ile Asn Gly Asn Ile Thr Asn Lys Lys Gly Asp Leu Asn Ile Lys
515 520 525

Asp Ile Lys Ala Asn Ala Glu Ile Gln Ile Gly Gly Asn Ile Ser Gln
530 535 540

Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp Lys Ile Asn Ile Thr Lys
545 550 555 560

Arg Ile Glu Ile Lys Ala Asp Thr Asp Gln Gly Asn Ser Asp Ser Gly
565 570 575

Val Ala Ser Asn Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Thr Leu
580 585 590

Thr Asp Asn Leu Asn Ile Ser Gly Phe Asn Lys Ala Glu Ile Thr Ala
595 600 605

Lys Asp Asn Ser Asp Leu Ile Ile Gly Lys Ala Ser Ser Asp Asn Ser
610 615 620

Asn Ala Lys Gln Ile Thr Phe Asp Lys Val Lys Asp Ser Lys Ile Ser
625 630 635 640

Ala Gly Asn His Asn Val Thr Leu Asn Ser Lys Val Glu Thr Ser Asn
645 650 655

Ser Asp Gly Ser Thr Gly Asn Gly Ser Asp Asp Asn Asn Ile Gly Leu
660 665 670

```
Thr Ile Ser Ala Lys Asp Val Thr Val Asn Ser Asn Ile Thr Ser His
        675                 680                 685

Lys Thr Val Asn Ile Ser Ala Ser Glu Gly Gly Ile Thr Thr Lys Ala
    690                 695                 700

Gly Thr Thr Ile Asn Ala Thr Thr Gly Ser Val Glu Val Thr Ala Lys
705                 710                 715                 720

Thr Gly Asp Ile Ser Gly Thr Ile Ser Gly Lys Thr Val Ser Val Thr
                725                 730                 735

Ala Thr Thr Asp Ser Leu Thr Val Lys Gly Gly Ala Lys Ile Asn Ala
            740                 745                 750

Thr Glu Gly Thr Ala Thr Leu Thr Ala Ser Ser Gly Lys Leu Thr Thr
        755                 760                 765

Glu Ala Asn Ser Ala Ile Ser Gly Ala Asn Gly Val Thr Ala Ser Ser
    770                 775                 780

Gln Ser Gly Asp Ile Ser Gly Thr Ile Ser Gly Lys Thr Val Ser Val
785                 790                 795                 800

Thr Ala Ser Ser Gly Ser Leu Thr Val Gly Gly Asp Ala Lys Ile Asn
                805                 810                 815

Ala Thr Glu Gly Ala Ala Thr Leu Thr Ala Thr Lys Gly Thr Leu Thr
            820                 825                 830

Thr Val Lys Gly Ser Asn Ile Asp Ala Asn Glu Gly Thr Leu Val Ile
        835                 840                 845

Asn Ala Gln Asp Ala Thr Leu Asn Gly Asp Ala Ser Gly Asp Arg Thr
    850                 855                 860

Glu Val Asn Ala Val Asn Ala Ser Gly Ser Gly Asn Val Thr Ala Lys
865                 870                 875                 880

Thr Ser Ser Ser Val Asn Ile Thr Gly Asp Leu Ser Thr Ile Asn Gly
                885                 890                 895

Leu Asn Ile Ile Ser Lys Asn Gly Lys Asn Thr Val Val Leu Lys Gly
            900                 905                 910

Ala Glu Ile Asp Val Lys Tyr Ile Gln Pro Gly Val Ala Ser Ala Asn
        915                 920                 925

Glu Val Ile Glu Ala Lys Arg Ala Leu Glu Lys Val Lys Asp Leu Ser
    930                 935                 940

Asp Glu Glu Arg Glu Thr Leu Ala Lys Leu Gly Val Ser Ala Val Arg
945                 950                 955                 960

Phe Ile Glu Pro Asn Asn Thr Ile Thr Val Asn Thr Gln Asn Glu Phe
                965                 970                 975

Thr Thr Arg Pro Ser Ser Gln Val Thr Ile Ser Glu Gly Lys Ala Cys
            980                 985                 990
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Phe Ser Ser Gly Asn Gly Ala Ala Val Cys Thr Asn Val Ala Asp Asp
995 1000 1005

Gly Gln Gln
1010

<210> 40
<211> 3018
<212> DNA
<213> Haemophilus influenzae

<400> 40
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tccaccgctt tacaaaaggg tattgaggtc aacatttctg ccacaaaaaa tgtaaccgtc 180
aacgcggatg ttgatgttaa aaacggaaca ttagtattac attcacaaag gaatggagtt 240
aaaattaacg gtaatattac ctcaacacaa aatggtaatt taaccattaa aacaggtggc 300
aaggttgatg ttcataaaaa tatcacactt ggtatgggtt ttttgaatat tacttccgat 360
aataacatca cctttgaaaa aggtgataat ctaaccatta ccgcccaagg aaatataatc 420
tctaatcaag agaataaaca acttagattt agtaatgtat ctttaaatgg gatgggtgcg 480
ggtttaactt ttactgcaaa taaaggtaat catacccata agtttgatgg cacgcttaac 540
atttccggaa aggtagtaat taatcaaacc acacctcaca acattgctcc atggaatgca 600
agtgcagact cttactggaa tgtaactact cttactttag gtaataatgc gcaatttacc 660
tttattaaat ttgtcgatag caaccgctcg gtagctctta atagcggttc aagaagtttt 720
gcgggggtaa agttctacgg caagaataat gaaatgaaat ttaatattgg tgataatgct 780
aatgttgaat tcaagttaaa atcaaatgat aatacaagca acaacaaacc actaccaatt 840
cagtttttat ctaatatctc agccactggt aatggcactg tatcttttga tatacatgcc 900
aacttgtcag caaggtcaac tgagttaaat atgagtttaa ttaacatttc taatggggtt 960
aatttttcca taaactccca tgttcgcggt aataatgctt ttgaaatcaa aaaagattta 1020
attataaatg caactggctc gaattttaat cttaagcaaa cgaaagataa atttgacaat 1080
agttacgaaa aaaacgccat tttctcaact cataacctaa ccattcttgg cggcaatgtt 1140
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ctaaatatta ccggcacctt taccaacaac ggcaccgccg acattaatat aaaacaagga 1440
gtggtaaaac tccaaggtga tattaccaat aacggtaatt taaatatcac tactaacgcc 1500
tcagtcaatc aaaaaaccat tattaacgga aatataacta acaaaaaagg cgacttaaac 1560
atcaaggata ttaaagccaa cgccgaaatc caaattggcg gcaatatctc gcaaaaagaa 1620
ggtaatctca cgatttcttc tgacaaaatt aatatcacca aacggataga aattaaggca 1680
gatactgatc aagggaattc tgattcaggc gtagcaagta atgctaatct aaccattaaa 1740
accaaagagt taacattaac agacaatcta aacatttcag gttttaataa agcagaaatt 1800
acagctaaag ataacagtga tttaattatt ggcaaggcta gcagtgacaa cagtaatgct 1860
aaacaaataa cctttgacaa ggttaaagat tcaaaaatct cagctggcaa tcacaatgta 1920
acactaaata gcaaagtgga aacgtctaat agcgatggta gcaccggaaa cggtagcgat 1980
gacaacaata tcggcttaac tatttccgca aaagatgtaa cggtaaatag taatatcacc 2040
tctcacaaaa cagtaaatat ctctgcatca gaaggaggta tcactactaa agcaggcaca 2100
accattaatg cgaccacagg tagcgtggaa gtaactgcta aaacaggcga tattagcggt 2160
acgatttccg gtaagacagt aagtgttaca gcaaccaccg acagtttaac tgttaaaggt 2220
ggcgcaaaaa ttaatgcgac agaaggaact gcaaccttaa ctgcatcatc gggcaaatta 2280
accaccgagg ccaactctgc gattagcggg gctaacggtg taactgcctc aagtcaatca 2340
ggcgatatta gcggtacgat ttccggtaag acagtaagtg ttacagcaag ctctggcagt 2400
ttaactgttg gaggtgacgc aaaaattaat gcgacagaag gagctgcgac tttaactgca 2460
acaaaaggca ctttaactac cgtgaagggt tcaaacattg acgcaaacga aggcacctta 2520
gttattaacg cacaagacgc cacactaaat ggtgatgcat caggcgaccg tacagaagtg 2580
aatgcagtca acgcaagcgg ctctggtaac gtaactgcga aaacctcaag cagtgtgaat 2640
atcactggag atttaagcac aataaatgga ttaaatatca tttcgaaaaa tggtaaaaac 2700

accgtagtgt taaaaggtgc tgaaattgat gtgaaatata ttcaaccagg tgtagcaagt 2760
gcgaatgagg ttattgaagc gaagcgtgcc cttgaaaaag taaaagattt atctgatgaa 2820
gaaagagaaa cattagctaa acttggtgta agtgctgtac gttttattga accaaataat 2880
accattacgg ttaacacaca aaatgagttt acaaccagac catcaagtca agtgacaatt 2940
tctgaaggta aggcgtgttt ctcaagtggt aatggcgcag cagtatgtac caatgttgct 3000
gacgatggac agcagtag 3018

<210> 41
<211> 1005
<212> PRT
<213> Haemophilus influenzae

<400> 41

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Pro Asp Asp Ile Asn Ile Val Asn Gly Ser Asn Ile Asp Ala Gln Leu
  1               5                  10                  15

Gln Pro Gly Arg Gly Asp Thr Pro Asn Lys Val Ser Ala Glu Gly Leu
             20                  25                  30

Thr Ser Ile Asn Asn Ala Thr Leu Ser Thr Ala Leu Gln Lys Gly Ile
         35                  40                  45

Glu Val Asn Ile Ser Ala Thr Lys Asn Val Thr Val Asn Ala Asp Val
     50                  55                  60

Asp Val Lys Asn Gly Thr Leu Val Leu His Ser Gln Arg Asn Gly Val
 65                  70                  75                  80

Lys Ile Asn Gly Asn Ile Thr Ser Thr Gln Asn Gly Asn Leu Thr Ile
                 85                  90                  95

Lys Thr Gly Gly Lys Val Asp Val His Lys Asn Ile Thr Leu Gly Met
            100                 105                 110

Gly Phe Leu Asn Ile Thr Ser Asp Asn Asn Ile Thr Phe Glu Lys Gly
        115                 120                 125

Asp Asn Leu Thr Ile Thr Ala Gln Gly Asn Ile Ile Ser Asn Gln Glu
    130                 135                 140

Asn Lys Gln Leu Arg Phe Ser Asn Val Ser Leu Asn Gly Met Gly Ala
145                 150                 155                 160

Gly Leu Thr Phe Thr Ala Asn Lys Gly Asn His Thr His Lys Phe Asp
                165                 170                 175

Gly Thr Leu Asn Ile Ser Gly Lys Val Val Ile Asn Gln Thr Thr Pro
            180                 185                 190

His Asn Ile Ala Pro Trp Asn Ala Ser Ala Asp Ser Tyr Trp Asn Val
        195                 200                 205

Thr Thr Leu Thr Leu Gly Asn Asn Ala Gln Phe Thr Phe Ile Lys Phe
    210                 215                 220

Val Asp Ser Asn Arg Ser Val Ala Leu Asn Ser Gly Ser Arg Ser Phe
225                 230                 235                 240
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Ala Gly Val Lys Phe Tyr Gly Lys Asn Asn Glu Met Lys Phe Asn Ile
                245                 250                 255

Gly Asp Asn Ala Asn Val Glu Phe Lys Leu Lys Ser Asn Asp Asn Thr
            260                 265                 270

Ser Asn Asn Lys Pro Leu Pro Ile Gln Phe Leu Ser Asn Ile Ser Ala
        275                 280                 285

Thr Gly Asn Gly Thr Val Ser Phe Asp Ile His Ala Asn Leu Ser Ala
    290                 295                 300

Arg Ser Thr Glu Leu Asn Met Ser Leu Ile Asn Ile Ser Asn Gly Val
305                 310                 315                 320

Asn Phe Ser Ile Asn Ser His Val Arg Gly Asn Asn Ala Phe Glu Ile
                325                 330                 335

Lys Lys Asp Leu Ile Ile Asn Ala Thr Gly Ser Asn Phe Asn Leu Lys
            340                 345                 350

Gln Thr Lys Asp Lys Phe Asp Asn Ser Tyr Glu Lys Asn Ala Ile Phe
        355                 360                 365

Ser Thr His Asn Leu Thr Ile Leu Gly Gly Asn Val Thr Leu Gly Gly
    370                 375                 380

Glu Asn Ser Ser Ser Asn Ile Lys Gly Asn Ile Asn Ile Asn Ser Lys
385                 390                 395                 400

Ala Asn Val Thr Leu Gln Ala His Ala Gly Thr Ser His Leu Asp Lys
                405                 410                 415

Lys Glu Arg Thr Leu Thr Leu Gly Asn Val Ser Val Gly Gly Asn Leu
            420                 425                 430

Asn Ile Ile Gly Ser Asn Ala His Ile Asp Gly Asn Leu Ser Ile Ala
        435                 440                 445

Glu Ser Ala Lys Phe Gln Gly Lys Thr Asn Asn Asn Leu Asn Ile Thr
    450                 455                 460

Gly Thr Phe Thr Asn Asn Gly Thr Ala Asp Ile Asn Ile Lys Gln Gly
465                 470                 475                 480

Val Val Lys Leu Gln Gly Asp Ile Thr Asn Asn Gly Asn Leu Asn Ile
                485                 490                 495

Thr Thr Asn Ala Ser Val Asn Gln Lys Thr Ile Ile Asn Gly Asn Ile
            500                 505                 510

Thr Asn Lys Lys Gly Asp Leu Asn Ile Lys Asp Ile Lys Ala Asn Ala
        515                 520                 525

Glu Ile Gln Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr
    530                 535                 540

Ile Ser Ser Asp Lys Ile Asn Ile Thr Lys Arg Ile Glu Ile Lys Ala
545                 550                 555                 560
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Asp Thr Asp Gln Gly Asn Ser Asp Ser Gly Val Ala Ser Asn Ala Asn
                565                 570                 575

Leu Thr Ile Lys Thr Lys Glu Leu Thr Leu Thr Asp Asn Leu Asn Ile
            580                 585                 590

Ser Gly Phe Asn Lys Ala Glu Ile Thr Ala Lys Asp Asn Ser Asp Leu
        595                 600                 605

Ile Ile Gly Lys Ala Ser Ser Asp Asn Ser Asn Ala Lys Gln Ile Thr
    610                 615                 620

Phe Asp Lys Val Lys Asp Ser Lys Ile Ser Ala Gly Asn His Asn Val
625                 630                 635                 640

Thr Leu Asn Ser Lys Val Glu Thr Ser Asn Ser Asp Gly Ser Thr Gly
                645                 650                 655

Asn Gly Ser Asp Asp Asn Asn Ile Gly Leu Thr Ile Ser Ala Lys Asp
            660                 665                 670

Val Thr Val Asn Ser Asn Ile Thr Ser His Lys Thr Val Asn Ile Ser
        675                 680                 685

Ala Ser Glu Gly Gly Ile Thr Thr Lys Ala Gly Thr Thr Ile Asn Ala
    690                 695                 700

Thr Thr Gly Ser Val Glu Val Thr Ala Lys Thr Gly Asp Ile Ser Gly
705                 710                 715                 720

Thr Ile Ser Gly Lys Thr Val Ser Val Thr Ala Thr Thr Asp Ser Leu
                725                 730                 735

Thr Val Lys Gly Gly Ala Lys Ile Asn Ala Thr Glu Gly Thr Ala Thr
            740                 745                 750

Leu Thr Ala Ser Ser Gly Lys Leu Thr Thr Glu Ala Asn Ser Ala Ile
        755                 760                 765

Ser Gly Ala Asn Gly Val Thr Ala Ser Ser Gln Ser Gly Asp Ile Ser
    770                 775                 780

Gly Thr Ile Ser Gly Lys Thr Val Ser Val Thr Ala Ser Ser Gly Ser
785                 790                 795                 800

Leu Thr Val Gly Gly Asp Ala Lys Ile Asn Ala Thr Glu Gly Ala Ala
                805                 810                 815

Thr Leu Thr Ala Thr Lys Gly Thr Leu Thr Thr Val Lys Gly Ser Asn
            820                 825                 830

Ile Asp Ala Asn Glu Gly Thr Leu Val Ile Asn Ala Gln Asp Ala Thr
        835                 840                 845

Leu Asn Gly Asp Ala Ser Gly Asp Arg Thr Glu Val Asn Ala Val Asn
    850                 855                 860

Ala Ser Gly Ser Gly Asn Val Thr Ala Lys Thr Ser Ser Ser Val Asn
```

865 870 875 880

Ile Thr Gly Asp Leu Ser Thr Ile Asn Gly Leu Asn Ile Ile Ser Lys
885 890 895

Asn Gly Lys Asn Thr Val Val Leu Lys Gly Ala Glu Ile Asp Val Lys
900 905 910

Tyr Ile Gln Pro Gly Val Ala Ser Ala Asn Glu Val Ile Glu Ala Lys
915 920 925

Arg Ala Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu Arg Glu Thr
930 935 940

Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Ile Glu Pro Asn Asn
945 950 955 960

Thr Ile Thr Val Asn Thr Gln Asn Glu Phe Thr Thr Arg Pro Ser Ser
965 970 975

Gln Val Thr Ile Ser Glu Gly Lys Ala Cys Phe Ser Ser Gly Asn Gly
980 985 990

Ala Ala Val Cys Thr Asn Val Ala Asp Asp Gly Gln Gln
995 1000 1005

<210> 42
<211> 3306
<212> DNA
<213> Haemophilus influenzae

<400> 42
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aacgctcaaa acagaccaac aataacaaac acatctcttg agcaaatatt aaaaaatggc 180
acctttgtta acataaccgc caaaaataaa atcttagtta atagcgacat caatatcaaa 240
gagaactccc acctaatcct ctggagcgaa agagatggca acagcggcgt tcagattgat 300
ggcaatatta cttccgctac tggcggaagc ttaaccgttt actctagtgg ctgggttgat 360
gttcataaaa acattacact taattcaggg tacttaaaca ttacgactaa aagtggagat 420
gtcgccttcg aacaagggaa tgacctaacc attacaggtc aaggaactat taccgcaagc 480
aaaaaaggtt ttagatttga taatgttact ctaagtggag tgaaaaaggg gttccttttt 540
aaatacagcc aaaccaacaa taataaagat agcaatttcg aaaaccattt tagaggaact 600
ttaaatattt cagggaaagt agatatctta atgcaagcaa ggcaggagaa ctggaaccgc 660
agacactcgg gacgctccca ctggaatgta acccgattga atgtttctac aaatagttat 720
ctcaacatca ctattgataa cagtggcagc cgtccatccc ctggtgccgg ccctctatat 780
agacgttcgg gtttaaatgg catatcgttt aacaatgaca ctgtttttaa tgttgcgtca 840
ggttcggcag ttaactttag catcaagcca ccaatagtaa gcaatgtaca cgacgggaat 900
cacacattat tcaatgggaa tgtttcagtt ttaggggggag gggatgtcaa ctttcatttt 960
aacgcctcct ccagcaacca ctggactcat ggcgtggtta taaagtctca aaactttaat 1020
gcctcagaag ggtcaagctt aagattcaaa agcgaaggtt caacacgaac cgcttttaca 1080
atagaaagtg atttaacttt aaatgccact gggggcaata tatcattgaa ccaagttgca 1140
ggtattgatg gtaatctcca aaaaagcctt gtagccaata aaaacataac ctttgaaggg 1200
ggcaatatca cccttgcagc cgataaaaaa ccaatagaaa tcaaaggtaa tattactgtt 1260
aaagaaggag ccaatgtcac ccttcgtagc gcgaattatg gtaatgacaa atcagcttta 1320
agtataagag gaaatgtcac taataaaggc aatctcaccg ttaccggctc cgctatcaat 1380
atagaaaaaa atcttaccgt tgaaggtagt gctaagtttt tagctaatcc aaattacagc 1440
tttaacgtat ccggcctatt tgacaaccaa ggcaagtcaa acatttccat tgccaaagga 1500
ggggctcact ttaaagacat taataacact aagagtttaa acattactac caactccgac 1560

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actgataata aaaataacgc tgaaatccaa attggcggca atatctcgca aaaagaaggt 1680
aatctcacga tttcttccga taaaattaat atcactaacc agataacaat caagaagggt 1740
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gccaaagagg gtgccgattt aatcatcggt aatagtgata ataacaacaa tgctaatgct 1920
aaaaaagtaa cctttaacca ggttaaagat tcgaaaatct ctgctgacag tcacaatgta 1980
acactaaaca gtaaagtaga aacctctaat ggcaataatg acgctgaaag caataatggc 2040
gatggcacca gcttaactat taatgcaaaa aatataacag taaacaacaa tattacttct 2100
cacaaaacag taaatatcac tgcgtcagaa aatgttacca ccaaagcggg cacaaccatt 2160
aatgcaacca caggtagcgt agaagtaaca gccaaaacag gtgatattaa aggtaaagtt 2220
gaatccactt ccggctctgt aacacttact gcaaccggag aagctcttgc tgtaagcaac 2280
atttcaggca acactgttac catcactgca aataagggta aattaacaac tcaagcaggc 2340
tctacggtta gcgcgattaa cggtgtaact gcctcaagcc aatcaggcga tattagcggt 2400
acgatttccg gtaacacagt aaaagttagt gcgatcggtg atttgactac taaatccggc 2460
tcggaaatca aggcaaaaac aggtgaggct aacgtgacaa gtgcgacagg tacaattggt 2520
ggtacgattt ctggtaatgc agtaaatgtt acagcaaata ctggcgattt aactgttgaa 2580
gatgccgcaa aaattgatgc gacaggagga gccgcgaccc taactgcaac atcgggcaaa 2640
ttaaccacta aggctagttc aagcattact tcagctaata accaggtaaa cctttcagct 2700
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<210> 43
<211> 1101
<212> PRT
<213> Haemophilus influenzae

<400> 43

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Lys Glu Trp Leu Leu Asp Pro Asp Glu Val Thr Ile Gly Ala Gly Asp
  1               5                  10                  15

Val Gly Arg Ser Asp Asp Ser Ser Asp Thr Ala Phe Pro Thr Gly Thr
             20                  25                  30

Gly Glu Arg Asn Ser Pro Lys Thr Asn Ala Gln Asn Arg Pro Thr Ile
         35                  40                  45

Thr Asn Thr Ser Leu Glu Gln Ile Leu Lys Asn Gly Thr Phe Val Asn
     50                  55                  60

Ile Thr Ala Lys Asn Lys Ile Leu Val Asn Ser Asp Ile Asn Ile Lys
 65                  70                  75                  80

Glu Asn Ser His Leu Ile Leu Trp Ser Glu Arg Asp Gly Asn Ser Gly
                 85                  90                  95

Val Gln Ile Asp Gly Asn Ile Thr Ser Ala Thr Gly Gly Ser Leu Thr
            100                 105                 110
```

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Val Tyr Ser Ser Gly Trp Val Asp Val His Lys Asn Ile Thr Leu Asn
        115                 120                 125

Ser Gly Tyr Leu Asn Ile Thr Thr Lys Ser Gly Asp Val Ala Phe Glu
    130                 135                 140

Gln Gly Asn Asp Leu Thr Ile Thr Gly Gln Gly Thr Ile Thr Ala Ser
145                 150                 155                 160

Lys Lys Gly Phe Arg Phe Asp Asn Val Thr Leu Ser Gly Val Lys Lys
                165                 170                 175

Gly Phe Leu Phe Lys Tyr Ser Gln Thr Asn Asn Asn Lys Asp Ser Asn
            180                 185                 190

Phe Glu Asn His Phe Arg Gly Thr Leu Asn Ile Ser Gly Lys Val Asp
        195                 200                 205

Ile Leu Met Gln Ala Arg Gln Glu Asn Trp Asn Arg Arg His Ser Gly
    210                 215                 220

Arg Ser His Trp Asn Val Thr Arg Leu Asn Val Ser Thr Asn Ser Tyr
225                 230                 235                 240

Leu Asn Ile Thr Ile Asp Asn Ser Gly Ser Arg Pro Ser Pro Gly Ala
                245                 250                 255

Gly Pro Leu Tyr Arg Arg Ser Gly Leu Asn Gly Ile Ser Phe Asn Asn
            260                 265                 270

Asp Thr Val Phe Asn Val Ala Ser Gly Ser Ala Val Asn Phe Ser Ile
        275                 280                 285

Lys Pro Pro Ile Val Ser Asn Val His Asp Gly Asn His Thr Leu Phe
    290                 295                 300

Asn Gly Asn Val Ser Val Leu Gly Gly Gly Asp Val Asn Phe His Phe
305                 310                 315                 320

Asn Ala Ser Ser Ser Asn His Trp Thr His Gly Val Val Ile Lys Ser
                325                 330                 335

Gln Asn Phe Asn Ala Ser Glu Gly Ser Ser Leu Arg Phe Lys Ser Glu
            340                 345                 350

Gly Ser Thr Arg Thr Ala Phe Thr Ile Glu Ser Asp Leu Thr Leu Asn
        355                 360                 365

Ala Thr Gly Gly Asn Ile Ser Leu Asn Gln Val Ala Gly Ile Asp Gly
    370                 375                 380

Asn Leu Gln Lys Ser Leu Val Ala Asn Lys Asn Ile Thr Phe Glu Gly
385                 390                 395                 400

Gly Asn Ile Thr Leu Ala Ala Asp Lys Lys Pro Ile Glu Ile Lys Gly
                405                 410                 415

Asn Ile Thr Val Lys Glu Gly Ala Asn Val Thr Leu Arg Ser Ala Asn
            420                 425                 430
```

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Tyr Gly Asn Asp Lys Ser Ala Leu Ser Ile Arg Gly Asn Val Thr Asn
        435                 440                 445

Lys Gly Asn Leu Thr Val Thr Gly Ser Ala Ile Asn Ile Glu Lys Asn
    450                 455                 460

Leu Thr Val Glu Gly Ser Ala Lys Phe Leu Ala Asn Pro Asn Tyr Ser
465                 470                 475                 480

Phe Asn Val Ser Gly Leu Phe Asp Asn Gln Gly Lys Ser Asn Ile Ser
                485                 490                 495

Ile Ala Lys Gly Gly Ala His Phe Lys Asp Ile Asn Asn Thr Lys Ser
            500                 505                 510

Leu Asn Ile Thr Thr Asn Ser Asp Ser Ala Tyr Arg Thr Ile Ile Glu
        515                 520                 525

Gly Asn Ile Thr Asn Ser Asn Gly Asp Leu Asn Ile Thr Asp Asn Lys
    530                 535                 540

Asn Asn Ala Glu Ile Gln Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly
545                 550                 555                 560

Asn Leu Thr Ile Ser Ser Asp Lys Ile Asn Ile Thr Asn Gln Ile Thr
                565                 570                 575

Ile Lys Lys Gly Val Asn Lys Glu Asp Ser Asp Ser Ser Thr Ala Asn
            580                 585                 590

Asn Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Gln Leu Thr Gly Asp
        595                 600                 605

Leu Asn Ile Ser Gly Phe Asp Lys Ala Glu Ile Thr Ala Lys Glu Gly
    610                 615                 620

Ala Asp Leu Ile Ile Gly Asn Ser Asp Asn Asn Asn Asn Ala Asn Ala
625                 630                 635                 640

Lys Lys Val Thr Phe Asn Gln Val Lys Asp Ser Lys Ile Ser Ala Asp
                645                 650                 655

Ser His Asn Val Thr Leu Asn Ser Lys Val Glu Thr Ser Asn Gly Asn
            660                 665                 670

Asn Asp Ala Glu Ser Asn Asn Gly Asp Gly Thr Ser Leu Thr Ile Asn
        675                 680                 685

Ala Lys Asn Ile Thr Val Asn Asn Asn Ile Thr Ser His Lys Thr Val
    690                 695                 700

Asn Ile Thr Ala Ser Glu Asn Val Thr Thr Lys Ala Gly Thr Thr Ile
705                 710                 715                 720

Asn Ala Thr Thr Gly Ser Val Glu Val Thr Ala Lys Thr Gly Asp Ile
                725                 730                 735

Lys Gly Lys Val Glu Ser Thr Ser Gly Ser Val Thr Leu Thr Ala Thr
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740 745 750

Gly Glu Ala Leu Ala Val Ser Asn Ile Ser Gly Asn Thr Val Thr Ile
755 760 765

Thr Ala Asn Lys Gly Lys Leu Thr Thr Gln Ala Gly Ser Thr Val Ser
770 775 780

Ala Ile Asn Gly Val Thr Ala Ser Ser Gln Ser Gly Asp Ile Ser Gly
785 790 795 800

Thr Ile Ser Gly Asn Thr Val Lys Val Ser Ala Ile Gly Asp Leu Thr
805 810 815

Thr Lys Ser Gly Ser Glu Ile Lys Ala Lys Thr Gly Glu Ala Asn Val
820 825 830

Thr Ser Ala Thr Gly Thr Ile Gly Gly Thr Ile Ser Gly Asn Ala Val
835 840 845

Asn Val Thr Ala Asn Thr Gly Asp Leu Thr Val Glu Asp Ala Ala Lys
850 855 860

Ile Asp Ala Thr Gly Gly Ala Ala Thr Leu Thr Ala Thr Ser Gly Lys
865 870 875 880

Leu Thr Thr Lys Ala Ser Ser Ser Ile Thr Ser Ala Asn Asn Gln Val
885 890 895

Asn Leu Ser Ala Lys Asp Gly Ser Ile Gly Gly Asn Ile Asn Ala Ala
900 905 910

Asn Val Thr Leu Asn Thr Thr Gly Ala Leu Thr Thr Val Lys Gly Ser
915 920 925

Ser Ile Asn Ala Asn Ser Gly Thr Leu Val Ile Asn Ala Lys Asp Ala
930 935 940

Glu Leu Asn Gly Glu Ala Ser Gly Asn His Thr Val Val Asn Ala Thr
945 950 955 960

Asn Ala Asn Gly Ser Gly Ser Val Ile Ala Thr Thr Ser Ser Arg Val
965 970 975

Asn Ile Thr Gly Asp Leu Ile Thr Ile Asn Gly Leu Asn Ile Ile Ser
980 985 990

Lys Asn Gly Ile Asn Thr Val Leu Leu Lys Gly Val Lys Ile Asp Val
995 1000 1005

Lys Tyr Ile Gln Pro Gly Ile Ala Ser Val Asp Glu Val Ile Glu Ala
1010 1015 1020

Lys Arg Ile Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu Arg Glu
1025 1030 1035 1040

Ala Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Ala Glu Pro Asn
1045 1050 1055

Asn Ala Ile Thr Ile Asn Thr Gln Asn Glu Phe Thr Thr Arg Pro Ser
1060 1065 1070

Ser Gln Val Thr Ile Ser Glu Gly Lys Val Cys Phe Leu Ile Gly Asn
1075 1080 1085

Gly Ala Thr Ile Cys Thr Asn Ile Ala Asp Ile Glu Arg
1090 1095 1100

<210> 44
<211> 3288
<212> DNA
<213> Haemophilus influenzae

<400> 44
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acaataacaa acacatctct tgagcaaata ttaaaaaatg gcacctttgt taacataacc 180
gccaaaaata aaatcttagt taatagcgac atcaatatca aagagaactc ccacctaatc 240
ctctggagcg aaagagatgg caacagcggc gttcagattg atggcaatat tacttccgct 300
actggcggaa gcttaaccgt ttactctagt ggctgggttg atgttcataa aaacattaca 360
cttaattcag ggtacttaaa cattacgact aaaagtggag atgtcgcctt cgaacaaggg 420
aatgacctaa ccattacagg tcaaggaact attaccgcaa gcaaaaaagg ttttagattt 480
gataatgtta ctctaagtgg agtgaaaaag gggttccttt ttaaatacag ccaaaccaac 540
aataataaag atagcaattt cgaaaaccat tttagaggaa ctttaaatat ttcagggaaa 600
gtagatatct taatgcaagc aaggcaggag aactggaacc gcagacactc gggacgctcc 660
cactggaatg taacccgatt gaatgtttct acaaatagtt atctcaacat cactattgat 720
aacagtggca gccgtccatc ccctggtgcc ggccctctat atagacgttc gggtttaaat 780
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aatgtttcag ttttaggggg aggggatgtc aactttcatt ttaacgcctc ctccagcaac 960
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actaataaag gcaatctcac cgttaccggc tccgctatca atatagaaaa aaatcttacc 1380
gttgaaggta gtgctaagtt tttagctaat ccaaattaca gctttaacgt atccggccta 1440
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attaataaca ctaagagttt aaacattact accaactccg actccgctta ccgcactatt 1560
atagaaggca atataaccaa cagtaacggg gatttaaata tcactgataa taaaaataac 1620
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actgcgtcag aaaatgttac caccaaagcg ggcacaacca ttaatgcaac cacaggtagc 2160
gtagaagtaa cagccaaaac aggtgatatt aaaggtaaag ttgaatccac ttccggctct 2220
gtaacactta ctgcaaccgg agaagctctt gctgtaagca acatttcagg caacactgtt 2280
accatcactg caaataaggg taaattaaca actcaagcag gctctacggt tagcgcgatt 2340
aacggtgtaa ctgcctcaag ccaatcaggc gatattagcg gtacgatttc cggtaacaca 2400
gtaaaagtta gtgcgatcgg tgatttgact actaaatccg gctcggaaat caaggcaaaa 2460
acaggtgagg ctaacgtgac aagtgcgaca ggtacaattg gtggtacgat ttctggtaat 2520
gcagtaaatg ttacagcaaa tactggcgat ttaactgttg aagatgccgc aaaaattgat 2580

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gcgacaggag gagccgcgac cctaactgca acatcgggca aattaaccac taaggctagt 2640
tcaagcatta cttcagctaa taaccaggta aacctttcag ctaaggatgg tagcattggg 2700
ggaaatatca atgctgctaa tgtaacactg aatactacag gcgctctaac taccgtgaag 2760
ggttcaagca ttaacgcaaa cagcggcacc ttggttatta acgcaaaaga cgctgagcta 2820
aatggtgagg catcaggtaa ccatacagta gtgaatgcaa ccaacgcaaa tggctccggc 2880
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ggattaaata tcatttcaaa aaacggtata aacaccgtac tgttaaaagg cgttaaaatt 3000
gatgtgaaat acattcaacc gggtatagca agcgtagatg aagtaattga agcgaaacgc 3060
atccttgaga aggtaaaaga tttatctgat gaagaaagag aagcgttagc taaacttggc 3120
gtaagcgctg tacgttttgc tgagccaaat aatgccatta cgattaatac acaaaatgag 3180
tttacaacca gaccatcaag tcaagtgaca atttctgaag gtaaggtatg tttcttaatc 3240
ggcaatggtg caacaatatg caccaatatt gctgatattg agcggtag              3288
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<210> 45
<211> 1095
<212> PRT
<213> Haemophilus influenzae

<400> 45

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Pro Asp Glu Val Thr Ile Gly Ala Gly Asp Val Gly Arg Ser Asp Asp
  1               5                  10                  15

Ser Ser Asp Thr Ala Phe Pro Thr Gly Thr Gly Glu Arg Asn Ser Pro
             20                  25                  30

Lys Thr Asn Ala Gln Asn Arg Pro Thr Ile Thr Asn Thr Ser Leu Glu
         35                  40                  45

Gln Ile Leu Lys Asn Gly Thr Phe Val Asn Ile Thr Ala Lys Asn Lys
     50                  55                  60

Ile Leu Val Asn Ser Asp Ile Asn Ile Lys Glu Asn Ser His Leu Ile
 65                  70                  75                  80

Leu Trp Ser Glu Arg Asp Gly Asn Ser Gly Val Gln Ile Asp Gly Asn
                 85                  90                  95

Ile Thr Ser Ala Thr Gly Gly Ser Leu Thr Val Tyr Ser Ser Gly Trp
            100                 105                 110

Val Asp Val His Lys Asn Ile Thr Leu Asn Ser Gly Tyr Leu Asn Ile
        115                 120                 125

Thr Thr Lys Ser Gly Asp Val Ala Phe Glu Gln Gly Asn Asp Leu Thr
    130                 135                 140

Ile Thr Gly Gln Gly Thr Ile Thr Ala Ser Lys Lys Gly Phe Arg Phe
145                 150                 155                 160

Asp Asn Val Thr Leu Ser Gly Val Lys Lys Gly Phe Leu Phe Lys Tyr
                165                 170                 175

Ser Gln Thr Asn Asn Asn Lys Asp Ser Asn Phe Glu Asn His Phe Arg
            180                 185                 190

Gly Thr Leu Asn Ile Ser Gly Lys Val Asp Ile Leu Met Gln Ala Arg
        195                 200                 205
```

```
Gln Glu Asn Trp Asn Arg Arg His Ser Gly Arg Ser His Trp Asn Val
    210                 215                 220

Thr Arg Leu Asn Val Ser Thr Asn Ser Tyr Leu Asn Ile Thr Ile Asp
225                 230                 235                 240

Asn Ser Gly Ser Arg Pro Ser Pro Gly Ala Gly Pro Leu Tyr Arg Arg
                245                 250                 255

Ser Gly Leu Asn Gly Ile Ser Phe Asn Asn Asp Thr Val Phe Asn Val
            260                 265                 270

Ala Ser Gly Ser Ala Val Asn Phe Ser Ile Lys Pro Pro Ile Val Ser
        275                 280                 285

Asn Val His Asp Gly Asn His Thr Leu Phe Asn Gly Asn Val Ser Val
    290                 295                 300

Leu Gly Gly Gly Asp Val Asn Phe His Phe Asn Ala Ser Ser Ser Asn
305                 310                 315                 320

His Trp Thr His Gly Val Val Ile Lys Ser Gln Asn Phe Asn Ala Ser
                325                 330                 335

Glu Gly Ser Ser Leu Arg Phe Lys Ser Glu Gly Ser Thr Arg Thr Ala
            340                 345                 350

Phe Thr Ile Glu Ser Asp Leu Thr Leu Asn Ala Thr Gly Gly Asn Ile
        355                 360                 365

Ser Leu Asn Gln Val Ala Gly Ile Asp Gly Asn Leu Gln Lys Ser Leu
    370                 375                 380

Val Ala Asn Lys Asn Ile Thr Phe Glu Gly Gly Asn Ile Thr Leu Ala
385                 390                 395                 400

Ala Asp Lys Lys Pro Ile Glu Ile Lys Gly Asn Ile Thr Val Lys Glu
                405                 410                 415

Gly Ala Asn Val Thr Leu Arg Ser Ala Asn Tyr Gly Asn Asp Lys Ser
            420                 425                 430

Ala Leu Ser Ile Arg Gly Asn Val Thr Asn Lys Gly Asn Leu Thr Val
        435                 440                 445

Thr Gly Ser Ala Ile Asn Ile Glu Lys Asn Leu Thr Val Glu Gly Ser
    450                 455                 460

Ala Lys Phe Leu Ala Asn Pro Asn Tyr Ser Phe Asn Val Ser Gly Leu
465                 470                 475                 480

Phe Asp Asn Gln Gly Lys Ser Asn Ile Ser Ile Ala Lys Gly Gly Ala
                485                 490                 495

His Phe Lys Asp Ile Asn Asn Thr Lys Ser Leu Asn Ile Thr Thr Asn
            500                 505                 510

Ser Asp Ser Ala Tyr Arg Thr Ile Ile Glu Gly Asn Ile Thr Asn Ser
        515                 520                 525
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Asn Gly Asp Leu Asn Ile Thr Asp Asn Lys Asn Asn Ala Glu Ile Gln
    530                 535                 540

Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser
545                 550                 555                 560

Asp Lys Ile Asn Ile Thr Asn Gln Ile Thr Ile Lys Lys Gly Val Asn
                565                 570                 575

Lys Glu Asp Ser Asp Ser Ser Thr Ala Asn Asn Ala Asn Leu Thr Ile
            580                 585                 590

Lys Thr Lys Glu Leu Gln Leu Thr Gly Asp Leu Asn Ile Ser Gly Phe
        595                 600                 605

Asp Lys Ala Glu Ile Thr Ala Lys Glu Gly Ala Asp Leu Ile Ile Gly
    610                 615                 620

Asn Ser Asp Asn Asn Asn Asn Ala Asn Ala Lys Lys Val Thr Phe Asn
625                 630                 635                 640

Gln Val Lys Asp Ser Lys Ile Ser Ala Asp Ser His Asn Val Thr Leu
                645                 650                 655

Asn Ser Lys Val Glu Thr Ser Asn Gly Asn Asn Asp Ala Glu Ser Asn
            660                 665                 670

Asn Gly Asp Gly Thr Ser Leu Thr Ile Asn Ala Lys Asn Ile Thr Val
        675                 680                 685

Asn Asn Asn Ile Thr Ser His Lys Thr Val Asn Ile Thr Ala Ser Glu
    690                 695                 700

Asn Val Thr Thr Lys Ala Gly Thr Thr Ile Asn Ala Thr Thr Gly Ser
705                 710                 715                 720

Val Glu Val Thr Ala Lys Thr Gly Asp Ile Lys Gly Lys Val Glu Ser
                725                 730                 735

Thr Ser Gly Ser Val Thr Leu Thr Ala Thr Gly Glu Ala Leu Ala Val
            740                 745                 750

Ser Asn Ile Ser Gly Asn Thr Val Thr Ile Thr Ala Asn Lys Gly Lys
        755                 760                 765

Leu Thr Thr Gln Ala Gly Ser Thr Val Ser Ala Ile Asn Gly Val Thr
    770                 775                 780

Ala Ser Ser Gln Ser Gly Asp Ile Ser Gly Thr Ile Ser Gly Asn Thr
785                 790                 795                 800

Val Lys Val Ser Ala Ile Gly Asp Leu Thr Thr Lys Ser Gly Ser Glu
                805                 810                 815

Ile Lys Ala Lys Thr Gly Glu Ala Asn Val Thr Ser Ala Thr Gly Thr
            820                 825                 830

Ile Gly Gly Thr Ile Ser Gly Asn Ala Val Asn Val Thr Ala Asn Thr
```

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        835                 840                 845

Gly Asp Leu Thr Val Glu Asp Ala Ala Lys Ile Asp Ala Thr Gly Gly
    850                 855                 860

Ala Ala Thr Leu Thr Ala Thr Ser Gly Lys Leu Thr Thr Lys Ala Ser
865                 870                 875                 880

Ser Ser Ile Thr Ser Ala Asn Asn Gln Val Asn Leu Ser Ala Lys Asp
                885                 890                 895

Gly Ser Ile Gly Gly Asn Ile Asn Ala Ala Asn Val Thr Leu Asn Thr
            900                 905                 910

Thr Gly Ala Leu Thr Thr Val Lys Gly Ser Ser Ile Asn Ala Asn Ser
        915                 920                 925

Gly Thr Leu Val Ile Asn Ala Lys Asp Ala Glu Leu Asn Gly Glu Ala
    930                 935                 940

Ser Gly Asn His Thr Val Val Asn Ala Thr Asn Ala Asn Gly Ser Gly
945                 950                 955                 960

Ser Val Ile Ala Thr Thr Ser Ser Arg Val Asn Ile Thr Gly Asp Leu
                965                 970                 975

Ile Thr Ile Asn Gly Leu Asn Ile Ile Ser Lys Asn Gly Ile Asn Thr
            980                 985                 990

Val Leu Leu Lys Gly Val Lys Ile Asp Val Lys Tyr Ile Gln Pro Gly
        995                1000                1005

Ile Ala Ser Val Asp Glu Val Ile Glu Ala Lys Arg Ile Leu Glu Lys
   1010                1015                1020

Val Lys Asp Leu Ser Asp Glu Glu Arg Glu Ala Leu Ala Lys Leu Gly
1025                1030                1035                1040

Val Ser Ala Val Arg Phe Ala Glu Pro Asn Asn Ala Ile Thr Ile Asn
                1045                1050                1055

Thr Gln Asn Glu Phe Thr Thr Arg Pro Ser Ser Gln Val Thr Ile Ser
            1060                1065                1070

Glu Gly Lys Val Cys Phe Leu Ile Gly Asn Gly Ala Thr Ile Cys Thr
        1075                1080                1085

Asn Ile Ala Asp Ile Glu Arg
   1090                1095
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<210> 46
<211> 3240
<212> DNA
<213> Haemophilus influenzae

<400> 46
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aacagcgaaa ccaagtcaac attaacaaac acaactcttg aggggatgtt aaaaaggggg 180
ctttttgtta atatcaccgc cagaaataaa atccgagtta atagcaccat caatatcggg 240
gatagcggcc atttaaccct ttacaaaaaa agaaaaaatc gtagcgatgg tattcaaatt 300
aacaaggata ttacttctac aggcggaagt ttaactatta actccgacga ctgggttgat 360
attcatggaa atatcacgct tggtgagggc tttttaaata ttacctctag tgattccgtg 420
gctttcgagg gtggaaacgg caataaagga cgtagctcag caagtgctca aattatcgcg 480
cagggtacta taactcttac tggagaaaat aaaaccttta gactcaacaa tgtgtcttta 540
aatgggacgg gtaatggtct aagtattatt tcaacagcaa gcaatttatc tcatagactt 600
gacggtgaaa ttaatgtatc tggaaatgta acaattaatc aaaccacgca gcaaaacatt 660
gaatactgga aggctagcag cgattcttat tggaatgtca cttcttttaa tttgagagaa 720
gattcaaagt ttacctttat caaatacgtt aactctgcca gaaatggtga tgtaagagga 780
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aacaacaatc ttagtgttaa gagcggtgct aaattcaaag cagaaacaaa tgacaaccta 1440
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gcaaaactag gcaatattac caatgatggt aatttaaata tcactactaa tgctaaaaac 1560
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gaattgaaat taacagaaaa cctaaatatt tcaggttttg ataaagcaga aattgtagcc 1860
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<210> 47
<211> 1079
<212> PRT
<213> Haemophilus influenzae

<400> 47

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Ala Glu Arg Thr Asp Thr Gly Glu Asp Val Glu Tyr Thr Gly Thr Gly
            20                  25                  30

Ala Asp Ile Asn His Gln Lys Gln Asn Ser Glu Thr Lys Ser Thr Leu
        35                  40                  45

Thr Asn Thr Thr Leu Glu Gly Met Leu Lys Arg Gly Leu Phe Val Asn
    50                  55                  60

Ile Thr Ala Arg Asn Lys Ile Arg Val Asn Ser Thr Ile Asn Ile Gly
65                  70                  75                  80

Asp Ser Gly His Leu Thr Leu Tyr Lys Lys Arg Lys Asn Arg Ser Asp
                85                  90                  95

Gly Ile Gln Ile Asn Lys Asp Ile Thr Ser Thr Gly Gly Ser Leu Thr
            100                 105                 110

Ile Asn Ser Asp Asp Trp Val Asp Ile His Gly Asn Ile Thr Leu Gly
        115                 120                 125

Glu Gly Phe Leu Asn Ile Thr Ser Ser Asp Ser Val Ala Phe Glu Gly
    130                 135                 140

Gly Asn Gly Asn Lys Gly Arg Ser Ser Ala Ser Ala Gln Ile Ile Ala
145                 150                 155                 160

Gln Gly Thr Ile Thr Leu Thr Gly Glu Asn Lys Thr Phe Arg Leu Asn
                165                 170                 175

Asn Val Ser Leu Asn Gly Thr Gly Asn Gly Leu Ser Ile Ile Ser Thr
            180                 185                 190

Ala Ser Asn Leu Ser His Arg Leu Asp Gly Glu Ile Asn Val Ser Gly
        195                 200                 205

Asn Val Thr Ile Asn Gln Thr Thr Gln Gln Asn Ile Glu Tyr Trp Lys
    210                 215                 220

Ala Ser Ser Asp Ser Tyr Trp Asn Val Thr Ser Phe Asn Leu Arg Glu
225                 230                 235                 240

Asp Ser Lys Phe Thr Phe Ile Lys Tyr Val Asn Ser Ala Arg Asn Gly
                245                 250                 255

Asp Val Arg Gly Arg Ser Phe Ala Gly Val Ile Phe Asn Ala Lys Gly
            260                 265                 270

Leu Thr Thr Ser Phe Asn Val Lys Lys Gly Ser Thr Val Asp Phe Lys
        275                 280                 285

Leu Lys Pro Asn Ser Gly Tyr Asn Ser Gln Lys Arg Ile Pro Ile Gln
    290                 295                 300

Phe Gln Ser Asn Ile Ser Val Ser Gly Gly Gly Arg Val Asn Ile Asn
```

305 310 315 320

Thr Leu Ala Asn Leu Thr Gly Gly Gly Val Glu Ile Arg Ser Ser Ser
325 330 335

Ile Asn Val Ser Asp Gly Ser Thr Leu Ser Met Thr Ala Gln Ala Arg
340 345 350

Asp Arg Asn Ala Phe Glu Ile Thr Lys Asp Leu Val Ile Asn Ala Ser
355 360 365

Asn Ser Asn Leu Ser Ile Ile Gln Gln Asn Asp Gly Phe Asp Asn Asn
370 375 380

Gln Lys Ala Asn Ala Ile Asn Ser Lys Tyr Asn Val Thr Ile Gln Gly
385 390 395 400

Gly Asn Val Thr Leu Gly Gly Gln Asn Ser Ser Ser Thr Ile Thr Gly
405 410 415

Ser Val Asn Ile Gly Ala Asn Ala Asn Val Thr Leu Gln Ala His Asn
420 425 430

Gly Asn Asp Arg Asn Lys Lys Leu Thr Phe Gly Asn Val Ser Val Glu
435 440 445

Gly Glu Leu Arg Leu Val Gly Ala Ser Ala Asn Ile Asn Asn Asn Leu
450 455 460

Ser Val Lys Ser Gly Ala Lys Phe Lys Ala Glu Thr Asn Asp Asn Leu
465 470 475 480

Asn Ile Thr Gly Thr Phe Thr Asn Asn Gly Thr Ser Ile Ile Asp Val
485 490 495

Lys Lys Gly Ala Ala Lys Leu Gly Asn Ile Thr Asn Asp Gly Asn Leu
500 505 510

Asn Ile Thr Thr Asn Ala Lys Asn Gly Gln Lys Ser Val Ile Asn Gly
515 520 525

Asn Ile Thr Asn Asn Lys Gly Ala Leu Asn Ile Thr Asn Asn Gly Asn
530 535 540

Asp Thr Glu Ile Gln Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn
545 550 555 560

Leu Thr Ile Ser Ser Asp Lys Ile Asn Ile Thr Lys Arg Ile Glu Ile
565 570 575

Lys Ala Gly Thr Asp Gln Gly Asn Ser Asp Ser Gly Val Ala Ser Asn
580 585 590

Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Lys Leu Thr Glu Asn Leu
595 600 605

Asn Ile Ser Gly Phe Asp Lys Ala Glu Ile Val Ala Lys Glu Asn Asn
610 615 620

```
Asn Leu Ile Ile Gly Asn Asn Asn Gly Asp Asn Ala Asn Ala Lys Thr
625                 630                 635                 640

Val Thr Phe Asn Asn Val Lys Asp Ser Lys Ile Ser Ala Asn Gly His
                645                 650                 655

Asn Val Thr Leu Asn Ser Lys Val Glu Thr Ser Asp Gly Asn Ser Asn
            660                 665                 670

Thr Glu Gly Asn Ser Asp Asn Asn Ala Gly Leu Thr Ile Asp Ala Lys
        675                 680                 685

Asn Val Thr Val Asn Asn Asp Ile Thr Ser His Lys Thr Val Asn Ile
    690                 695                 700

Thr Ala Ser Glu Arg Ile Asp Thr Lys Ala Asp Thr Thr Ile Asn Ala
705                 710                 715                 720

Thr Thr Gly Asn Val Lys Leu Thr Ala Val Thr Ser Asp Ile Gln Gly
                725                 730                 735

Gly Ile Lys Ser Asn Ser Gly Asp Val Asn Ile Thr Thr Ser Thr Gly
            740                 745                 750

Ser Ile Asn Gly Lys Ile Glu Ser Lys Ser Gly Ser Val Thr Leu Thr
        755                 760                 765

Ala Thr Glu Lys Thr Leu Thr Val Gly Asn Val Ser Gly Asn Thr Val
    770                 775                 780

Thr Val Thr Ala Asn Arg Gly Ala Leu Thr Thr Leu Ala Gly Ser Thr
785                 790                 795                 800

Ile Asn Gly Thr Asn Gly Val Thr Thr Ser Ser Gln Ser Gly Glu Ile
                805                 810                 815

Gly Gly Glu Val Thr Gly Lys Thr Val Ser Val Thr Ala Thr Ala Gly
            820                 825                 830

Ser Leu Thr Val Lys Gly Gly Ala Lys Ile Asn Ala Thr Glu Gly Thr
        835                 840                 845

Ala Thr Leu Thr Ala Ser Ser Gly Lys Leu Thr Thr Glu Ala Ser Ser
    850                 855                 860

Asn Ile Thr Ser Ala Lys Gly Gln Val Asp Leu Ser Ala Gln Asp Gly
865                 870                 875                 880

Ser Ile Ala Gly Gln Ile Ser Ala Ala Asn Val Thr Leu Asn Thr Thr
                885                 890                 895

Gly Thr Leu Thr Thr Val Glu Gly Ser Ser Ile Asn Ala Asn Glu Gly
            900                 905                 910

Thr Leu Val Ile Asn Ala Asn Asp Ala Lys Leu Asp Gly Lys Ala Ser
        915                 920                 925

Gly Asn Arg Thr Glu Val Asn Ala Thr Asn Ala Ser Gly Ser Gly Ser
    930                 935                 940
```

```
Val Thr Ala Lys Thr Ser Ser Ser Val Asn Ile Thr Gly Asp Leu Asn
945                 950                 955                 960

Thr Ile Asn Gly Leu Asn Ile Ile Ser Glu Asn Gly Arg Asn Thr Val
                965                 970                 975

Arg Leu Arg Gly Lys Glu Ile Glu Val Lys Tyr Ile Gln Pro Gly Val
            980                 985                 990

Ala Ser Val Glu Glu Val Ile Glu Ala Lys Arg Val Leu Glu Lys Val
        995                1000                1005

Lys Asp Leu Ser Asp Glu Glu Arg Glu Thr Leu Ala Lys Leu Gly Val
   1010                1015                1020

Ser Ala Val Arg Phe Ile Glu Pro Asn Asn Thr Ile Thr Val Asn Thr
1025                1030                1035                1040

Gln Asn Glu Phe Thr Thr Arg Pro Ser Ser Gln Val Thr Ile Ser Glu
               1045                1050                1055

Gly Lys Ala Cys Phe Ser Ser Gly Asn Gly Ala Ala Val Cys Thr Asn
           1060                1065                1070

Val Ala Asp Asp Gly Gln Gln
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<210> 48
<211> 3222
<212> DNA
<213> Haemophilus influenzae

<400> 48

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acattaacaa acacaactct tgaggggatg ttaaaaaggg ggctttttgt taatatcacc 180
gccagaaata aaatccgagt taatagcacc atcaatatcg gggatagcgg ccatttaacc 240
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tctggaaatg taacaattaa tcaaaccacg cagcaaaaca ttgaatactg gaaggctagc 660
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```
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aaagtgaaag atttatctga tgaagaaaga gaaacattag ctaaacttgg tgtaagtgct 3060
gtacgtttta ttgaaccaaa taataccatt acggttaaca cacaaaatga gtttacaacc 3120
agaccatcaa gtcaagtgac aatttctgaa ggtaaggcgt gtttctcaag tggtaatggc 3180
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<210> 49
<211> 1073
<212> PRT
<213> Haemophilus influenzae

<400> 49

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Pro Asp Asp Val Ser Ile Asp Ala Pro Ser Ala Glu Arg Thr Asp Thr
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Gly Glu Asp Val Glu Tyr Thr Gly Thr Gly Ala Asp Ile Asn His Gln
             20                  25                  30

Lys Gln Asn Ser Glu Thr Lys Ser Thr Leu Thr Asn Thr Thr Leu Glu
         35                  40                  45

Gly Met Leu Lys Arg Gly Leu Phe Val Asn Ile Thr Ala Arg Asn Lys
     50                  55                  60

Ile Arg Val Asn Ser Thr Ile Asn Ile Gly Asp Ser Gly His Leu Thr
 65                  70                  75                  80

Leu Tyr Lys Lys Arg Lys Asn Arg Ser Asp Gly Ile Gln Ile Asn Lys
                 85                  90                  95

Asp Ile Thr Ser Thr Gly Gly Ser Leu Thr Ile Asn Ser Asp Asp Trp
            100                 105                 110
```

```
Val Asp Ile His Gly Asn Ile Thr Leu Gly Glu Gly Phe Leu Asn Ile
        115                 120                 125

Thr Ser Ser Asp Ser Val Ala Phe Glu Gly Gly Asn Gly Asn Lys Gly
    130                 135                 140

Arg Ser Ser Ala Ser Ala Gln Ile Ile Ala Gln Gly Thr Ile Thr Leu
145                 150                 155                 160

Thr Gly Glu Asn Lys Thr Phe Arg Leu Asn Asn Val Ser Leu Asn Gly
                165                 170                 175

Thr Gly Asn Gly Leu Ser Ile Ile Ser Thr Ala Ser Asn Leu Ser His
            180                 185                 190

Arg Leu Asp Gly Glu Ile Asn Val Ser Gly Asn Val Thr Ile Asn Gln
        195                 200                 205

Thr Thr Gln Gln Asn Ile Glu Tyr Trp Lys Ala Ser Ser Asp Ser Tyr
    210                 215                 220

Trp Asn Val Thr Ser Phe Asn Leu Arg Glu Asp Ser Lys Phe Thr Phe
225                 230                 235                 240

Ile Lys Tyr Val Asn Ser Ala Arg Asn Gly Asp Val Arg Gly Arg Ser
                245                 250                 255

Phe Ala Gly Val Ile Phe Asn Ala Lys Gly Leu Thr Thr Ser Phe Asn
            260                 265                 270

Val Lys Lys Gly Ser Thr Val Asp Phe Lys Leu Lys Pro Asn Ser Gly
        275                 280                 285

Tyr Asn Ser Gln Lys Arg Ile Pro Ile Gln Phe Gln Ser Asn Ile Ser
    290                 295                 300

Val Ser Gly Gly Gly Arg Val Asn Ile Asn Thr Leu Ala Asn Leu Thr
305                 310                 315                 320

Gly Gly Gly Val Glu Ile Arg Ser Ser Ser Ile Asn Val Ser Asp Gly
                325                 330                 335

Ser Thr Leu Ser Met Thr Ala Gln Ala Arg Asp Arg Asn Ala Phe Glu
            340                 345                 350

Ile Thr Lys Asp Leu Val Ile Asn Ala Ser Asn Ser Asn Leu Ser Ile
        355                 360                 365

Ile Gln Gln Asn Asp Gly Phe Asp Asn Asn Gln Lys Ala Asn Ala Ile
    370                 375                 380

Asn Ser Lys Tyr Asn Val Thr Ile Gln Gly Gly Asn Val Thr Leu Gly
385                 390                 395                 400

Gly Gln Asn Ser Ser Ser Thr Ile Thr Gly Ser Val Asn Ile Gly Ala
                405                 410                 415

Asn Ala Asn Val Thr Leu Gln Ala His Asn Gly Asn Asp Arg Asn Lys
            420                 425                 430
```

```
Lys Leu Thr Phe Gly Asn Val Ser Val Glu Gly Glu Leu Arg Leu Val
        435                 440                 445

Gly Ala Ser Ala Asn Ile Asn Asn Asn Leu Ser Val Lys Ser Gly Ala
    450                 455                 460

Lys Phe Lys Ala Glu Thr Asn Asp Asn Leu Asn Ile Thr Gly Thr Phe
465                 470                 475                 480

Thr Asn Asn Gly Thr Ser Ile Ile Asp Val Lys Lys Gly Ala Ala Lys
                485                 490                 495

Leu Gly Asn Ile Thr Asn Asp Gly Asn Leu Asn Ile Thr Thr Asn Ala
            500                 505                 510

Lys Asn Gly Gln Lys Ser Val Ile Asn Gly Asn Ile Thr Asn Asn Lys
        515                 520                 525

Gly Ala Leu Asn Ile Thr Asn Asn Gly Asn Asp Thr Glu Ile Gln Ile
    530                 535                 540

Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp
545                 550                 555                 560

Lys Ile Asn Ile Thr Lys Arg Ile Glu Ile Lys Ala Gly Thr Asp Gln
                565                 570                 575

Gly Asn Ser Asp Ser Gly Val Ala Ser Asn Ala Asn Leu Thr Ile Lys
            580                 585                 590

Thr Lys Glu Leu Lys Leu Thr Glu Asn Leu Asn Ile Ser Gly Phe Asp
        595                 600                 605

Lys Ala Glu Ile Val Ala Lys Glu Asn Asn Asn Leu Ile Ile Gly Asn
    610                 615                 620

Asn Asn Gly Asp Asn Ala Asn Ala Lys Thr Val Thr Phe Asn Asn Val
625                 630                 635                 640

Lys Asp Ser Lys Ile Ser Ala Asn Gly His Asn Val Thr Leu Asn Ser
                645                 650                 655

Lys Val Glu Thr Ser Asp Gly Asn Ser Asn Thr Glu Gly Asn Ser Asp
            660                 665                 670

Asn Asn Ala Gly Leu Thr Ile Asp Ala Lys Asn Val Thr Val Asn Asn
        675                 680                 685

Asp Ile Thr Ser His Lys Thr Val Asn Ile Thr Ala Ser Glu Arg Ile
    690                 695                 700

Asp Thr Lys Ala Asp Thr Thr Ile Asn Ala Thr Thr Gly Asn Val Lys
705                 710                 715                 720

Leu Thr Ala Val Thr Ser Asp Ile Gln Gly Gly Ile Lys Ser Asn Ser
                725                 730                 735

Gly Asp Val Asn Ile Thr Thr Ser Thr Gly Ser Ile Asn Gly Lys Ile
```

740 745 750

Glu Ser Lys Ser Gly Ser Val Thr Leu Thr Ala Thr Glu Lys Thr Leu
755 760 765

Thr Val Gly Asn Val Ser Gly Asn Thr Val Thr Val Thr Ala Asn Arg
770 775 780

Gly Ala Leu Thr Thr Leu Ala Gly Ser Thr Ile Asn Gly Thr Asn Gly
785 790 795 800

Val Thr Thr Ser Ser Gln Ser Gly Glu Ile Gly Gly Glu Val Thr Gly
805 810 815

Lys Thr Val Ser Val Thr Ala Thr Ala Gly Ser Leu Thr Val Lys Gly
820 825 830

Gly Ala Lys Ile Asn Ala Thr Glu Gly Thr Ala Thr Leu Thr Ala Ser
835 840 845

Ser Gly Lys Leu Thr Thr Glu Ala Ser Ser Asn Ile Thr Ser Ala Lys
850 855 860

Gly Gln Val Asp Leu Ser Ala Gln Asp Gly Ser Ile Ala Gly Gln Ile
865 870 875 880

Ser Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Val
885 890 895

Glu Gly Ser Ser Ile Asn Ala Asn Glu Gly Thr Leu Val Ile Asn Ala
900 905 910

Asn Asp Ala Lys Leu Asp Gly Lys Ala Ser Gly Asn Arg Thr Glu Val
915 920 925

Asn Ala Thr Asn Ala Ser Gly Ser Gly Ser Val Thr Ala Lys Thr Ser
930 935 940

Ser Ser Val Asn Ile Thr Gly Asp Leu Asn Thr Ile Asn Gly Leu Asn
945 950 955 960

Ile Ile Ser Glu Asn Gly Arg Asn Thr Val Arg Leu Arg Gly Lys Glu
965 970 975

Ile Glu Val Lys Tyr Ile Gln Pro Gly Val Ala Ser Val Glu Glu Val
980 985 990

Ile Glu Ala Lys Arg Val Leu Glu Lys Val Lys Asp Leu Ser Asp Glu
995 1000 1005

Glu Arg Glu Thr Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Ile
1010 1015 1020

Glu Pro Asn Asn Thr Ile Thr Val Asn Thr Gln Asn Glu Phe Thr Thr
1025 1030 1035 1040

Arg Pro Ser Ser Gln Val Thr Ile Ser Glu Gly Lys Ala Cys Phe Ser
1045 1050 1055

Ser Gly Asn Gly Ala Ala Val Cys Thr Asn Val Ala Asp Asp Gly Gln
1060 1065 1070

Gln

<210> 50
<211> 2952
<212> DNA
<213> Haemophilus influenzae

<400> 50
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catgcaggct ctatagaaca atctttgatg aagggtggtg cagttaatat ttctgctaca 180
aataaagtaa atgttactac agatattaat gtttataatg gagcattaac gttacactca 240
gaacgagatg gagttgaaat taacggtaat attacctcag aaaaaaatgg taatttaacc 300
attaaagcag gtagctgggt tgatgttcat aaaaatatca cacttggcga gggtttttg 360
aatattactt ccggtgatat cgccttcgaa aaaggtaata atctaaccat taccgctcaa 420
ggaaatataa cctctaataa agacggaaaa caacttagac ttaataatgt atctttaaat 480
ggaacaggtg caggtttaaa ctttattgca aatcaaaata attttacaca caacattagt 540
ggcgcgatta acatttccgg agtagtaacg attaatcaaa ctacgaaaaa aaacgctaag 600
gcatggaata caagctatga ctcttactgg aacgtatcta ctcttacttt aagcaatgat 660
gcgaaattta cctttattaa atatgtcgac agcaatcatt cgacaaactc cagtgattca 720
cgaagttttg cgggagtaaa gttccacggc aagaataatg aaatgaaatt taatattggt 780
aataatgcca aggctgaatt taggttaaaa ccaaatgaga agacaactcc taacagacca 840
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ggacagccgt ag 2952

<210> 51
<211> 983
<212> PRT
<213> Haemophilus influenzae

<400> 51

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Glu Leu Gln Asn Asp Leu Val Val Arg Gly Asp Ser Ile Glu Lys Lys
             20                  25                  30

Asn Ala Pro Thr Lys Thr Thr Ile His Ala Gly Ser Ile Glu Gln Ser
         35                  40                  45

Leu Met Lys Gly Gly Ala Val Asn Ile Ser Ala Thr Asn Lys Val Asn
     50                  55                  60

Val Thr Thr Asp Ile Asn Val Tyr Asn Gly Ala Leu Thr Leu His Ser
 65                  70                  75                  80

Glu Arg Asp Gly Val Glu Ile Asn Gly Asn Ile Thr Ser Glu Lys Asn
                 85                  90                  95

Gly Asn Leu Thr Ile Lys Ala Gly Ser Trp Val Asp Val His Lys Asn
            100                 105                 110

Ile Thr Leu Gly Glu Gly Phe Leu Asn Ile Thr Ser Gly Asp Ile Ala
        115                 120                 125

Phe Glu Lys Gly Asn Asn Leu Thr Ile Thr Ala Gln Gly Asn Ile Thr
    130                 135                 140

Ser Asn Lys Asp Gly Lys Gln Leu Arg Leu Asn Asn Val Ser Leu Asn
145                 150                 155                 160

Gly Thr Gly Ala Gly Leu Asn Phe Ile Ala Asn Gln Asn Asn Phe Thr
                165                 170                 175

His Asn Ile Ser Gly Ala Ile Asn Ile Ser Gly Val Val Thr Ile Asn
            180                 185                 190

Gln Thr Thr Lys Lys Asn Ala Lys Ala Trp Asn Thr Ser Tyr Asp Ser
        195                 200                 205

Tyr Trp Asn Val Ser Thr Leu Thr Leu Ser Asn Asp Ala Lys Phe Thr
    210                 215                 220

Phe Ile Lys Tyr Val Asp Ser Asn His Ser Thr Asn Ser Ser Asp Ser
225                 230                 235                 240

Arg Ser Phe Ala Gly Val Lys Phe His Gly Lys Asn Asn Glu Met Lys
                245                 250                 255
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```
Phe Asn Ile Gly Asn Asn Ala Lys Ala Glu Phe Arg Leu Lys Pro Asn
            260                 265                 270

Glu Lys Thr Thr Pro Asn Arg Pro Leu Pro Ile Gln Phe Leu Ser Asn
        275                 280                 285

Ile Ser Val Thr Gly Gly Gly Ser Val Phe Phe Asp Ile Tyr Ala Asn
    290                 295                 300

Leu Trp Gly Lys Gly Thr Glu Leu Lys Met Asp Ser Ile Asn Val Ser
305                 310                 315                 320

Ser Gly Ser Asn Leu Thr Leu Asn Ser His Val Arg Lys Tyr Asn Ala
                325                 330                 335

Phe Glu Ile Asn Lys Asp Leu Thr Ile Asn Ala Thr Asn Ser Asn Phe
            340                 345                 350

Asn Leu Arg Gln Thr Ser Asp Ser Phe Arg Asn Gly Tyr Arg Asn Asn
        355                 360                 365

Ala Ile Asn Ser Thr His Asn Ile Ser Ile Leu Gly Gly Asn Val Thr
    370                 375                 380

Leu Gly Gly Gln Asn Ser Ser Ser Ser Ile Met Gly Asn Ile Ile Ile
385                 390                 395                 400

Lys Arg Ala Ala Asn Val Thr Leu Glu Ala Asp Asn Ser His Asn Ser
                405                 410                 415

Asp Asn Val Lys Asp Arg Thr Ile Asn Leu Gly Asn Leu Thr Val Glu
            420                 425                 430

Gly Asn Leu Ser Leu Ile Gly Glu Asn Ala Asn Ile Asn Gly Asn Leu
        435                 440                 445

Ser Ile Glu Lys Glu Ala Ile Phe Lys Gly Lys Thr Lys Asp Ser Leu
    450                 455                 460

Asn Ile Thr Gly Asn Phe Thr Asn Asn Gly Thr Ala Glu Ile Asn Ile
465                 470                 475                 480

Ser Gln Gly Val Val Ser Leu Gly Asp Ile Thr Asn Asp Gly Lys Leu
                485                 490                 495

Asn Ile Thr Thr His Ala Lys Ser Gly Gln Lys Ser Ile Ile Arg Gly
            500                 505                 510

Asp Ile Ile Asn Lys Gln Gly Asn Leu Asn Ile Thr Asp Asn Asn Ser
        515                 520                 525

Asn Ala Glu Ile Glu Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn
    530                 535                 540

Leu Thr Ile Ser Ser Asp Lys Val Asn Ile Thr Lys Gln Ile Thr Ile
545                 550                 555                 560

Lys Ala Gly Val Asp Gly Glu Ser Ser Ser Ser Ser Thr Ala Ser Asp
```

565 570 575

Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Thr Leu Thr Asp Asn Leu
580 585 590

Asn Ile Ser Gly Phe Asn Lys Ala Glu Ile Thr Ala Lys Asp Asn Ser
595 600 605

Asp Leu Ile Ile Gly Lys Ala Ser Ser Asp Asn Ser Asn Ala Lys Gln
610 615 620

Val Thr Phe Asp Lys Val Lys Asp Ser Lys Ile Ser Ala Gly Asn His
625 630 635 640

Asn Val Thr Leu Asn Ser Lys Val Glu Thr Ser Asn Ser Asp Gly Ser
645 650 655

Thr Gly Asn Gly Ser Asp Asp Asn Asn Ile Gly Leu Thr Ile Ser Ala
660 665 670

Lys Asp Val Thr Val Asn Ser Asn Ile Thr Ser His Lys Thr Val Asn
675 680 685

Ile Ser Ala Ser Glu Gly Gly Ile Thr Thr Lys Ala Gly Thr Thr Ile
690 695 700

Asn Ala Thr Thr Gly Ser Val Glu Val Thr Ala Lys Thr Gly Asp Ile
705 710 715 720

Ser Gly Thr Ile Ser Gly Lys Thr Val Ser Val Thr Ala Ser Thr Gly
725 730 735

Asp Leu Thr Val Arg Lys Ala Ala Thr Ile Ser Ala Thr Glu Gly Ala
740 745 750

Ala Thr Leu Thr Ala Thr Gly Asn Thr Leu Thr Thr Glu Ala Gly Ser
755 760 765

Ser Ile Thr Ser Thr Lys Gly Gln Val Asp Leu Ser Ala Gln Asp Gly
770 775 780

Ser Ile Ala Gly Gln Ile Ser Ala Ala Asn Val Thr Leu Asn Thr Thr
785 790 795 800

Gly Thr Leu Thr Thr Val Glu Gly Ser Asn Ile Lys Ala Thr Ser Gly
805 810 815

Thr Leu Ala Ile Asn Ala Lys Asp Ala Lys Leu Asp Gly Thr Ala Ser
820 825 830

Gly Asn Arg Thr Glu Val Asn Ala Thr Asn Ala Ser Gly Ser Gly Ser
835 840 845

Val Thr Ala Lys Thr Ser Ser Asn Val Asn Ile Thr Gly Asp Leu Ser
850 855 860

Thr Ile Asn Gly Leu Asn Ile Ile Ser Glu Asn Gly Arg Asn Thr Val
865 870 875 880

Arg Leu Arg Gly Lys Glu Ile Asp Val Lys Tyr Ile Gln Pro Gly Val
885 890 895

Ala Ser Val Glu Glu Val Ile Glu Ala Lys Arg Val Leu Glu Lys Val
900 905 910

Lys Asp Leu Ser Asp Glu Glu Arg Glu Thr Leu Ala Lys Leu Gly Val
915 920 925

Ser Ala Val Arg Phe Val Glu Pro Asn Asn Ala Ile Thr Ile Asn Thr
930 935 940

Gln Asn Glu Phe Thr Thr Arg Pro Ser Ser Gln Val Ile Ile Ser Glu
945 950 955 960

Gly Lys Ala Cys Phe Ser Ser Gly Asn Gly Ala Ala Val Cys Thr Asn
965 970 975

Val Ala Asp Asp Gly Gln Pro
980

<210> 52
<211> 2934
<212> DNA
<213> Haemophilus influenzae

<400> 52
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gatagtattg agaaaaagaa tgcccctacc aagactacaa ttcatgcagg ctctatagaa 120
caatctttga tgaagggtgg tgcagttaat atttctgcta caaataaagt aaatgttact 180
acagatatta atgtttataa tggagcatta acgttacact cagaacgaga tggagttgaa 240
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aactttattg caaatcaaaa taattttaca cacaacatta gtggcgcgat taacatttcc 540
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gactcttact ggaacgtatc tactcttact ttaagcaatg atgcgaaatt taccttttatt 660
aaatatgtcg acagcaatca ttcgacaaac tccagtgatt cacgaagttt tgcgggagta 720
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acgctagaag ccgataatag tcacaattct gacaacgtaa aggatagaac tataaatctt 1260
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cttggcgata ttaccaatga tggcaaatta aacatcacca ctcacgccaa gagcggtcaa 1500
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atttcttctg ataaagtcaa tattaccaaa cagataacaa tcaaagcagg cgttgatggg 1680
gagagttcta gttcaagcac agcaagtgat gccaatctaa ccattaaaac caaagagtta 1740
acattaacag acaatctaaa catttcaggt tttaataaag cagaaattac agctaaagat 1800
aacagtgatt taattattgg caaggctagc agtgacaaca gtaatgctaa acaagtaacc 1860

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ggcttaacta tttccgcaaa agatgtaacg gtaaatagta atatcacctc tcacaaaaca 2040
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gaatttacaa ccagaccgtc aagtcaagtg ataatttctg aaggtaaggc gtgtttctca 2880
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<210> 53
<211> 977
<212> PRT
<213> Haemophilus influenzae

<400> 53

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Pro Asp Asn Val Asn Ile Val Lys Gly Thr Glu Leu Gln Asn Asp Leu
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Val Val Arg Gly Asp Ser Ile Glu Lys Lys Asn Ala Pro Thr Lys Thr
             20                  25                  30

Thr Ile His Ala Gly Ser Ile Glu Gln Ser Leu Met Lys Gly Gly Ala
         35                  40                  45

Val Asn Ile Ser Ala Thr Asn Lys Val Asn Val Thr Thr Asp Ile Asn
     50                  55                  60

Val Tyr Asn Gly Ala Leu Thr Leu His Ser Glu Arg Asp Gly Val Glu
 65                  70                  75                  80

Ile Asn Gly Asn Ile Thr Ser Glu Lys Asn Gly Asn Leu Thr Ile Lys
                 85                  90                  95

Ala Gly Ser Trp Val Asp Val His Lys Asn Ile Thr Leu Gly Glu Gly
            100                 105                 110

Phe Leu Asn Ile Thr Ser Gly Asp Ile Ala Phe Glu Lys Gly Asn Asn
        115                 120                 125

Leu Thr Ile Thr Ala Gln Gly Asn Ile Thr Ser Asn Lys Asp Gly Lys
    130                 135                 140

Gln Leu Arg Leu Asn Asn Val Ser Leu Asn Gly Thr Gly Ala Gly Leu
145                 150                 155                 160

Asn Phe Ile Ala Asn Gln Asn Asn Phe Thr His Asn Ile Ser Gly Ala
                165                 170                 175
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Ile Asn Ile Ser Gly Val Val Thr Ile Asn Gln Thr Thr Lys Lys Asn
            180                 185                 190

Ala Lys Ala Trp Asn Thr Ser Tyr Asp Ser Tyr Trp Asn Val Ser Thr
        195                 200                 205

Leu Thr Leu Ser Asn Asp Ala Lys Phe Thr Phe Ile Lys Tyr Val Asp
    210                 215                 220

Ser Asn His Ser Thr Asn Ser Ser Asp Ser Arg Ser Phe Ala Gly Val
225                 230                 235                 240

Lys Phe His Gly Lys Asn Asn Glu Met Lys Phe Asn Ile Gly Asn Asn
                245                 250                 255

Ala Lys Ala Glu Phe Arg Leu Lys Pro Asn Glu Lys Thr Thr Pro Asn
            260                 265                 270

Arg Pro Leu Pro Ile Gln Phe Leu Ser Asn Ile Ser Val Thr Gly Gly
        275                 280                 285

Gly Ser Val Phe Phe Asp Ile Tyr Ala Asn Leu Trp Gly Lys Gly Thr
    290                 295                 300

Glu Leu Lys Met Asp Ser Ile Asn Val Ser Ser Gly Ser Asn Leu Thr
305                 310                 315                 320

Leu Asn Ser His Val Arg Lys Tyr Asn Ala Phe Glu Ile Asn Lys Asp
                325                 330                 335

Leu Thr Ile Asn Ala Thr Asn Ser Asn Phe Asn Leu Arg Gln Thr Ser
            340                 345                 350

Asp Ser Phe Arg Asn Gly Tyr Arg Asn Asn Ala Ile Asn Ser Thr His
        355                 360                 365

Asn Ile Ser Ile Leu Gly Gly Asn Val Thr Leu Gly Gly Gln Asn Ser
    370                 375                 380

Ser Ser Ser Ile Met Gly Asn Ile Ile Ile Lys Arg Ala Ala Asn Val
385                 390                 395                 400

Thr Leu Glu Ala Asp Asn Ser His Asn Ser Asp Asn Val Lys Asp Arg
                405                 410                 415

Thr Ile Asn Leu Gly Asn Leu Thr Val Glu Gly Asn Leu Ser Leu Ile
            420                 425                 430

Gly Glu Asn Ala Asn Ile Asn Gly Asn Leu Ser Ile Glu Lys Glu Ala
        435                 440                 445

Ile Phe Lys Gly Lys Thr Lys Asp Ser Leu Asn Ile Thr Gly Asn Phe
    450                 455                 460

Thr Asn Asn Gly Thr Ala Glu Ile Asn Ile Ser Gln Gly Val Val Ser
465                 470                 475                 480

Leu Gly Asp Ile Thr Asn Asp Gly Lys Leu Asn Ile Thr Thr His Ala
                485                 490                 495
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Lys Ser Gly Gln Lys Ser Ile Ile Arg Gly Asp Ile Ile Asn Lys Gln
500 505 510

Gly Asn Leu Asn Ile Thr Asp Asn Asn Ser Asn Ala Glu Ile Glu Ile
515 520 525

Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp
530 535 540

Lys Val Asn Ile Thr Lys Gln Ile Thr Ile Lys Ala Gly Val Asp Gly
545 550 555 560

Glu Ser Ser Ser Ser Ser Thr Ala Ser Asp Ala Asn Leu Thr Ile Lys
565 570 575

Thr Lys Glu Leu Thr Leu Thr Asp Asn Leu Asn Ile Ser Gly Phe Asn
580 585 590

Lys Ala Glu Ile Thr Ala Lys Asp Asn Ser Asp Leu Ile Ile Gly Lys
595 600 605

Ala Ser Ser Asp Asn Ser Asn Ala Lys Gln Val Thr Phe Asp Lys Val
610 615 620

Lys Asp Ser Lys Ile Ser Ala Gly Asn His Asn Val Thr Leu Asn Ser
625 630 635 640

Lys Val Glu Thr Ser Asn Ser Asp Gly Ser Thr Gly Asn Gly Ser Asp
645 650 655

Asp Asn Asn Ile Gly Leu Thr Ile Ser Ala Lys Asp Val Thr Val Asn
660 665 670

Ser Asn Ile Thr Ser His Lys Thr Val Asn Ile Ser Ala Ser Glu Gly
675 680 685

Gly Ile Thr Thr Lys Ala Gly Thr Thr Ile Asn Ala Thr Thr Gly Ser
690 695 700

Val Glu Val Thr Ala Lys Thr Gly Asp Ile Ser Gly Thr Ile Ser Gly
705 710 715 720

Lys Thr Val Ser Val Thr Ala Ser Thr Gly Asp Leu Thr Val Arg Lys
725 730 735

Ala Ala Thr Ile Ser Ala Thr Glu Gly Ala Ala Thr Leu Thr Ala Thr
740 745 750

Gly Asn Thr Leu Thr Thr Glu Ala Gly Ser Ser Ile Thr Ser Thr Lys
755 760 765

Gly Gln Val Asp Leu Ser Ala Gln Asp Gly Ser Ile Ala Gly Gln Ile
770 775 780

Ser Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Val
785 790 795 800

Glu Gly Ser Asn Ile Lys Ala Thr Ser Gly Thr Leu Ala Ile Asn Ala

805 810 815

Lys Asp Ala Lys Leu Asp Gly Thr Ala Ser Gly Asn Arg Thr Glu Val
820 825 830

Asn Ala Thr Asn Ala Ser Gly Ser Gly Ser Val Thr Ala Lys Thr Ser
835 840 845

Ser Asn Val Asn Ile Thr Gly Asp Leu Ser Thr Ile Asn Gly Leu Asn
850 855 860

Ile Ile Ser Glu Asn Gly Arg Asn Thr Val Arg Leu Arg Gly Lys Glu
865 870 875 880

Ile Asp Val Lys Tyr Ile Gln Pro Gly Val Ala Ser Val Glu Glu Val
885 890 895

Ile Glu Ala Lys Arg Val Leu Glu Lys Val Lys Asp Leu Ser Asp Glu
900 905 910

Glu Arg Glu Thr Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Val
915 920 925

Glu Pro Asn Asn Ala Ile Thr Ile Asn Thr Gln Asn Glu Phe Thr Thr
930 935 940

Arg Pro Ser Ser Gln Val Ile Ile Ser Glu Gly Lys Ala Cys Phe Ser
945 950 955 960

Ser Gly Asn Gly Ala Ala Val Cys Thr Asn Val Ala Asp Asp Gly Gln
965 970 975

Pro

<210> 54
<211> 3033
<212> DNA
<213> Haemophilus influenzae

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acaaaccatc cagacaagcc gacattaaca aacacaactg ttgagaacgc attaaaaaac 180
aacacctttg ttaacataac cgccaaaaat aaaatcacag ttaatagcga catcaatatc 240
aaaggtggcg cccacctaac cctctatagc aaaaacaata aaaaaagtag cgttaagatt 300
aatggcaata ttacttctac cactaacgga aacttaacta tttactccag cggctgggtt 360
gatatccata aaaacattac gcttaacaca ggttacctga atattaccgc tgggggttct 420
gtagccttcg agaaagccgg aaatgagaaa gggcgccaag tatcagaatc tgtaatcaaa 480
gcccagggag ttatcacctc aggtgtaggg gaaggcttta ggtttaataa cgtctcccta 540
aatggcgttg gcgcaggact gcgcttcgtt ggtcagaaaa atatcagtag caactcttgg 600
agagaaaaca ccatcaaaaa cagattcgat gggaatttaa atatctcagg aaaggtaaat 660
gtttcaatgg atgtatccgg gacaaagtgg catacaagaa ttaacgggcg cacctactgg 720
aatgtaacca ctctaaacgt tgcctcaggt agtagtttca atctcagtat cgacgccagt 780
ggaatttctt caggtaacca ggacgacata acaaataggg gtttaaatgg cataacattt 840
aatggagaaa acacttttaa tatcgcacag ggctcaacag ctaactttca tatcaaaacg 900
tcagtaatga cccctaaacc caactcgaac tacgcattat ttaatggaaa tatttcagtt 960
ttaggaggag gaactgtcaa ctttgaactt aatgcctcat ctagcaccca cacaacttct 1020

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ggcaaattaa acatcaccac tcacgccaag agcggtcaaa aaagcattat ccgcggagat 1620
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<210> 55
<211> 1010
<212> PRT
<213> Haemophilus influenzae

<400> 55

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Pro Gly Arg Asn Asp Gly Ser Val Asp Asp Phe Phe Pro Thr Gly Arg
            20                  25                  30

Gly Asp Asp Ala Ser Asn Ala Lys Thr Asn His Pro Asp Lys Pro Thr
        35                  40                  45

Leu Thr Asn Thr Thr Val Glu Asn Ala Leu Lys Asn Asn Thr Phe Val
    50                  55                  60

Asn Ile Thr Ala Lys Asn Lys Ile Thr Val Asn Ser Asp Ile Asn Ile
65                  70                  75                  80

Lys Gly Gly Ala His Leu Thr Leu Tyr Ser Lys Asn Asn Lys Lys Ser
                85                  90                  95
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Ser Val Lys Ile Asn Gly Asn Ile Thr Ser Thr Thr Asn Gly Asn Leu
            100                 105                 110

Thr Ile Tyr Ser Ser Gly Trp Val Asp Ile His Lys Asn Ile Thr Leu
        115                 120                 125

Asn Thr Gly Tyr Leu Asn Ile Thr Ala Gly Gly Ser Val Ala Phe Glu
    130                 135                 140

Lys Ala Gly Asn Glu Lys Gly Arg Gln Val Ser Glu Ser Val Ile Lys
145                 150                 155                 160

Ala Gln Gly Val Ile Thr Ser Gly Val Gly Glu Gly Phe Arg Phe Asn
                165                 170                 175

Asn Val Ser Leu Asn Gly Val Gly Ala Gly Leu Arg Phe Val Gly Gln
            180                 185                 190

Lys Asn Ile Ser Ser Asn Ser Trp Arg Glu Asn Thr Ile Lys Asn Arg
        195                 200                 205

Phe Asp Gly Asn Leu Asn Ile Ser Gly Lys Val Asn Val Ser Met Asp
    210                 215                 220

Val Ser Gly Thr Lys Trp His Thr Arg Ile Asn Gly Arg Thr Tyr Trp
225                 230                 235                 240

Asn Val Thr Thr Leu Asn Val Ala Ser Gly Ser Ser Phe Asn Leu Ser
                245                 250                 255

Ile Asp Ala Ser Gly Ile Ser Ser Gly Asn Gln Asp Asp Ile Thr Asn
            260                 265                 270

Arg Gly Leu Asn Gly Ile Thr Phe Asn Gly Glu Asn Thr Phe Asn Ile
        275                 280                 285

Ala Gln Gly Ser Thr Ala Asn Phe His Ile Lys Thr Ser Val Met Thr
    290                 295                 300

Pro Lys Pro Asn Ser Asn Tyr Ala Leu Phe Asn Gly Asn Ile Ser Val
305                 310                 315                 320

Leu Gly Gly Gly Thr Val Asn Phe Glu Leu Asn Ala Ser Ser Ser Thr
                325                 330                 335

His Thr Thr Ser Gly Ala Ile Ile Asn Ser Gln Asn Phe Asn Val Ser
            340                 345                 350

Gly Gly Ser Lys Leu Asn Leu Lys Ala Ser Gly Ser Thr Asn Thr Ala
        355                 360                 365

Phe Leu Ile Lys Asn Asn Leu Thr Leu Asn Ala Thr Gly Gly Asn Ile
    370                 375                 380

Glu Ile Lys Gln Val Glu Gly Thr Asp Ser Arg Ile Gln Lys Gly Val
385                 390                 395                 400

Val Ala Glu Gln Asn Ile Ile Phe Glu Gly Gly Asn Ile Thr Leu Gly
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405 410 415

Ser Gln Lys Ala Pro Thr Glu Ile Lys Gly Asp Val Thr Val Lys Gln
420 425 430

Gly Thr Asn Ala Thr Leu Arg Ser Ala Asn Phe Asp Asn His Lys Gly
435 440 445

Ala Leu Ile Val Asn Gly Asn Val Thr Ala Asn Gly Asn Leu Thr Ala
450 455 460

Asp Gly Asp Thr Ile Lys Ile Lys Gly Asn Leu Asp Val Ala Gln Gly
465 470 475 480

Ala Lys Phe Asn Gly Ser Thr Lys Asn Asn Leu Asn Ile Thr Gly Thr
485 490 495

Phe Thr Asn Asn Gly Thr Ser Ile Ile Asp Ile Thr Gln Gly Val Val
500 505 510

Asn Leu Gly Asn Val Thr Asn Asp Gly Lys Leu Asn Ile Thr Thr His
515 520 525

Ala Lys Ser Gly Gln Lys Ser Ile Ile Arg Gly Asp Ile Ile Asn Lys
530 535 540

Gln Gly Asn Leu Asn Ile Thr Asp Asn Asn Ser Asn Ala Glu Ile Glu
545 550 555 560

Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser
565 570 575

Asp Lys Val Asn Ile Thr Lys Gln Ile Thr Ile Lys Ala Gly Val Asp
580 585 590

Gly Glu Ser Ser Ser Ser Ser Thr Ala Ser Asp Ala Asn Leu Thr Ile
595 600 605

Lys Thr Lys Glu Leu Thr Phe Thr Asp Asn Leu Asn Ile Ser Gly Phe
610 615 620

Asn Lys Ala Glu Ile Thr Ala Lys Asp Asn Ser Asp Leu Ile Ile Gly
625 630 635 640

Lys Ala Ser Ser Asp Asn Ser Asn Ala Lys Gln Val Thr Phe Asp Lys
645 650 655

Val Lys Asp Ser Lys Ile Ser Ala Gly Asn His Asn Val Thr Leu Asn
660 665 670

Ser Lys Val Glu Thr Ser Asn Ser Asp Gly Ser Thr Gly Asn Gly Ser
675 680 685

Asp Asp Asn Asn Ile Gly Leu Thr Ile Ser Ala Lys Asp Val Thr Val
690 695 700

Asn Ser Asn Ile Thr Ser His Lys Thr Val Asn Ile Ser Ala Ser Glu
705 710 715 720

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Gly Gly Ile Thr Thr Lys Ala Gly Thr Thr Ile Asn Ala Thr Thr Gly
                725                 730                 735

Ser Val Glu Val Thr Ala Lys Thr Gly Asp Ile Ser Gly Thr Ile Ser
            740                 745                 750

Gly Lys Thr Val Ser Val Thr Ala Ser Thr Gly Asp Leu Thr Val Arg
        755                 760                 765

Lys Ala Ala Thr Ile Ser Val Thr Glu Gly Ala Ala Thr Leu Thr Ala
    770                 775                 780

Thr Gly Asn Thr Leu Thr Thr Glu Ala Gly Ser Ser Ile Thr Ser Thr
785                 790                 795                 800

Lys Gly Gln Val Asp Leu Ser Ala Gln Asp Gly Ser Ile Ala Gly Gln
                805                 810                 815

Ile Ser Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr
            820                 825                 830

Val Glu Gly Ser Asn Ile Lys Ala Thr Ser Gly Thr Leu Ala Ile Asn
        835                 840                 845

Ala Lys Asp Ala Lys Leu Asp Gly Thr Ala Ser Gly Asn Arg Thr Glu
    850                 855                 860

Val Asn Ala Thr Asn Ala Ser Gly Ser Gly Ser Val Thr Ala Lys Thr
865                 870                 875                 880

Ser Ser Asn Val Asn Ile Thr Gly Asp Leu Ser Thr Ile Asn Gly Leu
                885                 890                 895

Asn Ile Ile Ser Glu Asn Gly Arg Asn Thr Val Arg Leu Arg Gly Lys
            900                 905                 910

Glu Ile Asp Val Lys Tyr Ile Gln Pro Gly Val Ala Ser Val Glu Glu
        915                 920                 925

Val Ile Glu Ala Lys Arg Val Leu Glu Lys Val Lys Asp Leu Ser Asp
    930                 935                 940

Glu Glu Arg Glu Thr Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe
945                 950                 955                 960

Val Glu Pro Asn Asn Ala Ile Thr Ile Asn Thr Gln Asn Glu Phe Thr
                965                 970                 975

Thr Arg Pro Ser Ser Gln Val Ile Ile Ser Glu Gly Lys Ala Cys Phe
            980                 985                 990

Ser Ser Gly Asn Gly Ala Ala Val Cys Thr Asn Val Ala Asp Asp Gly
        995                1000                1005

Gln Pro
   1010
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<210> 56

<211> 3015
<212> DNA
<213> Haemophilus influenzae

<400> 56
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ccgacattaa caaacacaac tgttgagaac gcattaaaaa acaacacctt tgttaacata 180
accgccaaaa ataaaatcac agttaatagc gacatcaata tcaaaggtgg cgcccaccta 240
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<210> 57

<211> 1004
<212> PRT
<213> Haemophilus influenzae

<400> 57

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            20                  25                  30

Ala Lys Thr Asn His Pro Asp Lys Pro Thr Leu Thr Asn Thr Thr Val
         35                  40                  45

Glu Asn Ala Leu Lys Asn Asn Thr Phe Val Asn Ile Thr Ala Lys Asn
     50                  55                  60

Lys Ile Thr Val Asn Ser Asp Ile Asn Ile Lys Gly Gly Ala His Leu
 65                  70                  75                  80

Thr Leu Tyr Ser Lys Asn Asn Lys Lys Ser Ser Val Lys Ile Asn Gly
                 85                  90                  95

Asn Ile Thr Ser Thr Thr Asn Gly Asn Leu Thr Ile Tyr Ser Ser Gly
            100                 105                 110

Trp Val Asp Ile His Lys Asn Ile Thr Leu Asn Thr Gly Tyr Leu Asn
        115                 120                 125

Ile Thr Ala Gly Gly Ser Val Ala Phe Glu Lys Ala Gly Asn Glu Lys
    130                 135                 140

Gly Arg Gln Val Ser Glu Ser Val Ile Lys Ala Gln Gly Val Ile Thr
145                 150                 155                 160

Ser Gly Val Gly Glu Gly Phe Arg Phe Asn Asn Val Ser Leu Asn Gly
                165                 170                 175

Val Gly Ala Gly Leu Arg Phe Val Gly Gln Lys Asn Ile Ser Ser Asn
            180                 185                 190

Ser Trp Arg Glu Asn Thr Ile Lys Asn Arg Phe Asp Gly Asn Leu Asn
        195                 200                 205

Ile Ser Gly Lys Val Asn Val Ser Met Asp Val Ser Gly Thr Lys Trp
    210                 215                 220

His Thr Arg Ile Asn Gly Arg Thr Tyr Trp Asn Val Thr Thr Leu Asn
225                 230                 235                 240

Val Ala Ser Gly Ser Ser Phe Asn Leu Ser Ile Asp Ala Ser Gly Ile
                245                 250                 255

Ser Ser Gly Asn Gln Asp Asp Ile Thr Asn Arg Gly Leu Asn Gly Ile
            260                 265                 270

Thr Phe Asn Gly Glu Asn Thr Phe Asn Ile Ala Gln Gly Ser Thr Ala
        275                 280                 285
```

```
Asn Phe His Ile Lys Thr Ser Val Met Thr Pro Lys Pro Asn Ser Asn
    290                 295                 300

Tyr Ala Leu Phe Asn Gly Asn Ile Ser Val Leu Gly Gly Gly Thr Val
305                 310                 315                 320

Asn Phe Glu Leu Asn Ala Ser Ser Ser Thr His Thr Thr Ser Gly Ala
                325                 330                 335

Ile Ile Asn Ser Gln Asn Phe Asn Val Ser Gly Gly Ser Lys Leu Asn
            340                 345                 350

Leu Lys Ala Ser Gly Ser Thr Asn Thr Ala Phe Leu Ile Lys Asn Asn
        355                 360                 365

Leu Thr Leu Asn Ala Thr Gly Gly Asn Ile Glu Ile Lys Gln Val Glu
    370                 375                 380

Gly Thr Asp Ser Arg Ile Gln Lys Gly Val Val Ala Glu Gln Asn Ile
385                 390                 395                 400

Ile Phe Glu Gly Gly Asn Ile Thr Leu Gly Ser Gln Lys Ala Pro Thr
                405                 410                 415

Glu Ile Lys Gly Asp Val Thr Val Lys Gln Gly Thr Asn Ala Thr Leu
            420                 425                 430

Arg Ser Ala Asn Phe Asp Asn His Lys Gly Ala Leu Ile Val Asn Gly
        435                 440                 445

Asn Val Thr Ala Asn Gly Asn Leu Thr Ala Asp Gly Asp Thr Ile Lys
    450                 455                 460

Ile Lys Gly Asn Leu Asp Val Ala Gln Gly Ala Lys Phe Asn Gly Ser
465                 470                 475                 480

Thr Lys Asn Asn Leu Asn Ile Thr Gly Thr Phe Thr Asn Asn Gly Thr
                485                 490                 495

Ser Ile Ile Asp Ile Thr Gln Gly Val Val Asn Leu Gly Asn Val Thr
            500                 505                 510

Asn Asp Gly Lys Leu Asn Ile Thr Thr His Ala Lys Ser Gly Gln Lys
        515                 520                 525

Ser Ile Ile Arg Gly Asp Ile Ile Asn Lys Gln Gly Asn Leu Asn Ile
    530                 535                 540

Thr Asp Asn Asn Ser Asn Ala Glu Ile Glu Ile Gly Gly Asn Ile Ser
545                 550                 555                 560

Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp Lys Val Asn Ile Thr
                565                 570                 575

Lys Gln Ile Thr Ile Lys Ala Gly Val Asp Gly Glu Ser Ser Ser Ser
            580                 585                 590

Ser Thr Ala Ser Asp Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Thr
        595                 600                 605
```

```
Phe Thr Asp Asn Leu Asn Ile Ser Gly Phe Asn Lys Ala Glu Ile Thr
    610                 615                 620

Ala Lys Asp Asn Ser Asp Leu Ile Ile Gly Lys Ala Ser Ser Asp Asn
625                 630                 635                 640

Ser Asn Ala Lys Gln Val Thr Phe Asp Lys Val Lys Asp Ser Lys Ile
                645                 650                 655

Ser Ala Gly Asn His Asn Val Thr Leu Asn Ser Lys Val Glu Thr Ser
            660                 665                 670

Asn Ser Asp Gly Ser Thr Gly Asn Gly Ser Asp Asp Asn Asn Ile Gly
        675                 680                 685

Leu Thr Ile Ser Ala Lys Asp Val Thr Val Asn Ser Asn Ile Thr Ser
    690                 695                 700

His Lys Thr Val Asn Ile Ser Ala Ser Glu Gly Gly Ile Thr Thr Lys
705                 710                 715                 720

Ala Gly Thr Thr Ile Asn Ala Thr Thr Gly Ser Val Glu Val Thr Ala
                725                 730                 735

Lys Thr Gly Asp Ile Ser Gly Thr Ile Ser Gly Lys Thr Val Ser Val
            740                 745                 750

Thr Ala Ser Thr Gly Asp Leu Thr Val Arg Lys Ala Ala Thr Ile Ser
        755                 760                 765

Val Thr Glu Gly Ala Ala Thr Leu Thr Ala Thr Gly Asn Thr Leu Thr
    770                 775                 780

Thr Glu Ala Gly Ser Ser Ile Thr Ser Thr Lys Gly Gln Val Asp Leu
785                 790                 795                 800

Ser Ala Gln Asp Gly Ser Ile Ala Gly Gln Ile Ser Ala Ala Asn Val
                805                 810                 815

Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Val Glu Gly Ser Asn Ile
            820                 825                 830

Lys Ala Thr Ser Gly Thr Leu Ala Ile Asn Ala Lys Asp Ala Lys Leu
        835                 840                 845

Asp Gly Thr Ala Ser Gly Asn Arg Thr Glu Val Asn Ala Thr Asn Ala
    850                 855                 860

Ser Gly Ser Gly Ser Val Thr Ala Lys Thr Ser Ser Asn Val Asn Ile
865                 870                 875                 880

Thr Gly Asp Leu Ser Thr Ile Asn Gly Leu Asn Ile Ile Ser Glu Asn
                885                 890                 895

Gly Arg Asn Thr Val Arg Leu Arg Gly Lys Glu Ile Asp Val Lys Tyr
            900                 905                 910

Ile Gln Pro Gly Val Ala Ser Val Glu Glu Val Ile Glu Ala Lys Arg
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915 920 925

Val Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu Arg Glu Thr Leu
930 935 940

Ala Lys Leu Gly Val Ser Ala Val Arg Phe Val Glu Pro Asn Asn Ala
945 950 955 960

Ile Thr Ile Asn Thr Gln Asn Glu Phe Thr Thr Arg Pro Ser Ser Gln
965 970 975

Val Ile Ile Ser Glu Gly Lys Ala Cys Phe Ser Ser Gly Asn Gly Ala
980 985 990

Ala Val Cys Thr Asn Val Ala Asp Asp Gly Gln Pro
995 1000

<210> 58
<211> 2997
<212> DNA
<213> Haemophilus influenzae

<400> 58
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aacggcgaac agccgacagt attaaccaat gaaaccattt caaattatct gaaaagcggc 180
acctgggtaa tgaatataac agccaagaaa aatcttaccg ttaacagctc aattaacatt 240
ggagacagct cccacttaat ccttcatagt gaaggcaaga ataacggcgg tgttaagatt 300
aaagaagaca ttacctctaa tggcggaaac ttaaccattc aatccggcgg atgggttgat 360
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gcctttgagg gaaacggtac agaaaaagcc cgcaacgcat caagcgctca aatcaccgcg 480
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aatgtgacac taaatagcaa agtggaaaca tctggtaata ctgacaacac tggagacggc 2040
agtggcaata atgccggctt aactattgcc gcgaaaaatg tagaagtaaa aaacaacatt 2100

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<210> 59
<211> 998
<212> PRT
<213> Haemophilus influenzae

<400> 59

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Tyr Ser Arg Gly Asn Ala Gly Ile Asp Ser Glu Phe Pro Gly Gly Ser
             20                  25                  30

Gly Thr Lys Glu Ser Pro Lys Thr Asn Gly Glu Gln Pro Thr Val Leu
         35                  40                  45

Thr Asn Glu Thr Ile Ser Asn Tyr Leu Lys Ser Gly Thr Trp Val Met
     50                  55                  60

Asn Ile Thr Ala Lys Lys Asn Leu Thr Val Asn Ser Ser Ile Asn Ile
 65                  70                  75                  80

Gly Asp Ser Ser His Leu Ile Leu His Ser Glu Gly Lys Asn Asn Gly
                 85                  90                  95

Gly Val Lys Ile Lys Glu Asp Ile Thr Ser Asn Gly Gly Asn Leu Thr
            100                 105                 110

Ile Gln Ser Gly Gly Trp Val Asp Val His Lys Asn Ile Thr Leu Gly
        115                 120                 125

Thr Gly Thr Leu Asn Ile Thr Ala Lys Gly Ser Ile Ala Phe Glu Gly
    130                 135                 140

Asn Gly Thr Glu Lys Ala Arg Asn Ala Ser Ser Ala Gln Ile Thr Ala
145                 150                 155                 160

Gln Gly Thr Ile Thr Asn Thr Gly Asp Gln Lys Gln Leu Arg Leu Asn
                165                 170                 175

Asn Val Ser Ile Asn Gly Thr Gly Ile Gly Leu Asn Phe Val Ser Ile
            180                 185                 190
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Gln Pro Asn Thr Ser His Arg Phe Asp Gly Glu Leu Ile Ile Ser Gly
        195                 200                 205

Arg Val His Val Asn Gln Thr Thr Pro Lys Asn Leu Ser Phe Trp Lys
    210                 215                 220

Val Ser Asp Glu Ser Tyr Trp Asn Val Ser His Leu Thr Val Lys Glu
225                 230                 235                 240

Lys Ser Ala Phe Ser Phe Thr Lys Phe Ala Leu Asn Asn Asn His Gly
                245                 250                 255

Arg Glu Thr Ser Arg Tyr Arg Lys Gly Gly Gly Val Ile Phe Arg Ser
            260                 265                 270

Pro Thr Gly His Thr Asn Phe Thr Val Lys Gln Gly Ser Val Ala Asn
        275                 280                 285

Phe Ser Phe Lys Ala Lys Asn Asp Thr Asn His Ala Asn Gln Leu Pro
    290                 295                 300

Ile Gln Phe Asn Ser Asn Ile Ser Val Asp Gly Gly Gly Lys Val Leu
305                 310                 315                 320

Phe Cys Ile Thr Ser Asn Tyr Ser Gly Arg Ser Val Gly Ile Gly Met
                325                 330                 335

Ser Ser Ile Asn Val Ser Asp Gly Ser Asn Leu Thr Phe Asn Ser Ser
            340                 345                 350

Ile Arg Gly Gln Glu Ala Phe Asn Ile Ser Lys Asp Leu Thr Ile Asn
        355                 360                 365

Ala Thr Gly Ser Phe Phe Glu Leu Gly Gln Tyr Ser Asp Thr Phe Asn
    370                 375                 380

Gly Asn Gly Phe Asn His Asp Ala Ile Lys Ser Thr His Asn Ile Ser
385                 390                 395                 400

Ile Leu Gly Gly Asn Val Thr Leu Gly Gly Gln Asp Ser Ser Ser Thr
                405                 410                 415

Ile Thr Gly Asn Ile Asn Ile Ser Gln Ala Ala Asn Val Thr Leu Arg
            420                 425                 430

Ala Tyr Asn Gly Asn Gly Arg Asn Lys Gln Leu Thr Leu Gly Asn Val
        435                 440                 445

Ser Ile Glu Gly Asn Leu Ser Leu Ile Gly Ala Ser Ala Asn Ile Asn
    450                 455                 460

Gly Asn Leu Ser Val Lys Glu Asn Ala Lys Phe Lys Gly Glu Thr Gln
465                 470                 475                 480

Asp Asn Leu Asn Ile Thr Gly Thr Phe Ile Asn Asn Gly Asp Ser Lys
                485                 490                 495

Ile Asn Ile Ser Gln Gly Val Val Lys Leu Gly Asn Val Thr Asn Asp
            500                 505                 510
```

```
Gly Asp Leu Asn Ile Thr Thr His Ala Lys His Asn Gln Arg Ser Ile
        515                 520                 525

Ile Gly Gly Asp Ile Ile Asn Lys Lys Gly Ser Leu Asn Ile Thr Asp
    530                 535                 540

Ser Asn Lys Asn Ala Glu Ile Gln Ile Gly Gly Asn Ile Ser Gln Lys
545                 550                 555                 560

Glu Gly Asn Leu Thr Ile Ser Ser Asp Lys Ile Asn Ile Thr Asn Gln
                565                 570                 575

Ile Thr Ile Lys Ala Gly Val Asp Gly Glu Asn Ser Asp Ser Asp Ala
            580                 585                 590

Thr Asn Asn Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Lys Leu Thr
        595                 600                 605

Gln Asp Leu Asn Ile Ser Gly Phe Asn Lys Ala Glu Ile Thr Ala Lys
    610                 615                 620

Asp Gly Ser Asp Leu Thr Ile Gly Asn Thr Asn Ser Ala Asp Ser Thr
625                 630                 635                 640

Asn Ala Lys Lys Val Thr Phe Asn Gln Val Lys Asp Ser Lys Ile Ser
                645                 650                 655

Ala Gly Asp His Asn Val Thr Leu Asn Ser Lys Val Glu Thr Ser Gly
            660                 665                 670

Asn Thr Asp Asn Thr Gly Asp Gly Ser Gly Asn Asn Ala Gly Leu Thr
        675                 680                 685

Ile Ala Ala Lys Asn Val Glu Val Lys Asn Asn Ile Thr Ser Asn Lys
    690                 695                 700

Thr Val Asn Ile Thr Ala Ser Glu Lys Leu Thr Thr Lys Ala Asp Ala
705                 710                 715                 720

Thr Ile Asn Ala Thr Thr Gly Asn Val Glu Val Thr Ala Lys Thr Gly
                725                 730                 735

Asp Ile Lys Gly Glu Val Lys Ser Thr Ser Gly Asn Val Asn Ile Thr
            740                 745                 750

Ala Asn Gly Asp Thr Leu Asn Val Ser Asn Val Ser Gly Asn Ala Val
        755                 760                 765

Thr Ile Thr Ala Asp Lys Gly Lys Leu Thr Thr Gln Ala Ser Ser Ser
    770                 775                 780

Ile Thr Ser Asn Asn Gly Gln Thr Thr Leu Thr Ala Lys Asp Gly Ser
785                 790                 795                 800

Ile Ala Gly Ser Ile Asn Ala Ala Asn Val Thr Leu Asn Thr Thr Gly
                805                 810                 815

Thr Leu Thr Thr Val Glu Gly Ser Asn Ile Asn Ala Ala Ser Gly Thr
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Leu Val Ile Asn Ala Lys Asp Ala Lys Leu Asn Gly Ala Ala Ser Gly
835 840 845

Asp His Thr Val Val Asn Ala Thr Asn Ala Ser Gly Ser Gly Ser Val
850 855 860

Thr Ala Val Thr Ser Ser Asn Val Asn Ile Thr Gly Asp Leu Ser Thr
865 870 875 880

Val Asn Gly Leu Asn Ile Ile Ser Lys Asn Gly Arg Asn Thr Val Val
885 890 895

Leu Lys Gly Thr Glu Ile Glu Val Lys Tyr Ile Gln Pro Gly Val Ala
900 905 910

Ser Val Glu Glu Val Ile Glu Ala Lys Arg Val Leu Glu Lys Val Lys
915 920 925

Asp Leu Ser Asp Glu Glu Arg Glu Thr Leu Ala Lys Leu Gly Val Ser
930 935 940

Ala Val Arg Phe Ile Glu Pro Asn Asn Thr Ile Thr Val Asn Thr Gln
945 950 955 960

Asn Glu Phe Thr Thr Arg Pro Ser Ser Gln Val Thr Ile Ser Glu Gly
965 970 975

Lys Ala Cys Phe Ser Ser Gly Asn Gly Ala Ala Val Cys Thr Asn Val
980 985 990

Ala Asp Asp Gly Gln Gln
995

<210> 60
<211> 2979
<212> DNA
<213> Haemophilus influenzae

<400> 60
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tactccggca gatcagtggg gataggaatg tctagcatta atgtttctga tggctcaaac 1020

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<210> 61
<211> 992
<212> PRT
<213> Haemophilus influenzae

<400> 61

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Pro Asp Asn Val Thr Ile Glu Ala Pro Ser Tyr Ser Arg Gly Asn Ala
  1               5                  10                  15

Gly Ile Asp Ser Glu Phe Pro Gly Gly Ser Gly Thr Lys Glu Ser Pro
             20                  25                  30

Lys Thr Asn Gly Glu Gln Pro Thr Val Leu Thr Asn Glu Thr Ile Ser
         35                  40                  45

Asn Tyr Leu Lys Ser Gly Thr Trp Val Met Asn Ile Thr Ala Lys Lys
     50                  55                  60

Asn Leu Thr Val Asn Ser Ser Ile Asn Ile Gly Asp Ser Ser His Leu
 65                  70                  75                  80

Ile Leu His Ser Glu Gly Lys Asn Asn Gly Gly Val Lys Ile Lys Glu
                 85                  90                  95
```

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Asp Ile Thr Ser Asn Gly Gly Asn Leu Thr Ile Gln Ser Gly Gly Trp
          100                 105                 110

Val Asp Val His Lys Asn Ile Thr Leu Gly Thr Gly Thr Leu Asn Ile
      115                 120                 125

Thr Ala Lys Gly Ser Ile Ala Phe Glu Gly Asn Gly Thr Glu Lys Ala
  130                 135                 140

Arg Asn Ala Ser Ser Ala Gln Ile Thr Ala Gln Gly Thr Ile Thr Asn
145                 150                 155                 160

Thr Gly Asp Gln Lys Gln Leu Arg Leu Asn Asn Val Ser Ile Asn Gly
                165                 170                 175

Thr Gly Ile Gly Leu Asn Phe Val Ser Ile Gln Pro Asn Thr Ser His
            180                 185                 190

Arg Phe Asp Gly Glu Leu Ile Ile Ser Gly Arg Val His Val Asn Gln
      195                 200                 205

Thr Thr Pro Lys Asn Leu Ser Phe Trp Lys Val Ser Asp Glu Ser Tyr
  210                 215                 220

Trp Asn Val Ser His Leu Thr Val Lys Glu Lys Ser Ala Phe Ser Phe
225                 230                 235                 240

Thr Lys Phe Ala Leu Asn Asn Asn His Gly Arg Glu Thr Ser Arg Tyr
                245                 250                 255

Arg Lys Gly Gly Gly Val Ile Phe Arg Ser Pro Thr Gly His Thr Asn
            260                 265                 270

Phe Thr Val Lys Gln Gly Ser Val Ala Asn Phe Ser Phe Lys Ala Lys
      275                 280                 285

Asn Asp Thr Asn His Ala Asn Gln Leu Pro Ile Gln Phe Asn Ser Asn
  290                 295                 300

Ile Ser Val Asp Gly Gly Gly Lys Val Leu Phe Cys Ile Thr Ser Asn
305                 310                 315                 320

Tyr Ser Gly Arg Ser Val Gly Ile Gly Met Ser Ser Ile Asn Val Ser
                325                 330                 335

Asp Gly Ser Asn Leu Thr Phe Asn Ser Ser Ile Arg Gly Gln Glu Ala
            340                 345                 350

Phe Asn Ile Ser Lys Asp Leu Thr Ile Asn Ala Thr Gly Ser Phe Phe
      355                 360                 365

Glu Leu Gly Gln Tyr Ser Asp Thr Phe Asn Gly Asn Gly Phe Asn His
  370                 375                 380

Asp Ala Ile Lys Ser Thr His Asn Ile Ser Ile Leu Gly Gly Asn Val
385                 390                 395                 400

Thr Leu Gly Gly Gln Asp Ser Ser Ser Thr Ile Thr Gly Asn Ile Asn
                405                 410                 415
```

```
Ile Ser Gln Ala Ala Asn Val Thr Leu Arg Ala Tyr Asn Gly Asn Gly
            420                 425                 430

Arg Asn Lys Gln Leu Thr Leu Gly Asn Val Ser Ile Glu Gly Asn Leu
        435                 440                 445

Ser Leu Ile Gly Ala Ser Ala Asn Ile Asn Gly Asn Leu Ser Val Lys
    450                 455                 460

Glu Asn Ala Lys Phe Lys Gly Glu Thr Gln Asp Asn Leu Asn Ile Thr
465                 470                 475                 480

Gly Thr Phe Ile Asn Asn Gly Asp Ser Lys Ile Asn Ile Ser Gln Gly
                485                 490                 495

Val Val Lys Leu Gly Asn Val Thr Asn Asp Gly Asp Leu Asn Ile Thr
            500                 505                 510

Thr His Ala Lys His Asn Gln Arg Ser Ile Ile Gly Gly Asp Ile Ile
        515                 520                 525

Asn Lys Lys Gly Ser Leu Asn Ile Thr Asp Ser Asn Lys Asn Ala Glu
    530                 535                 540

Ile Gln Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile
545                 550                 555                 560

Ser Ser Asp Lys Ile Asn Ile Thr Asn Gln Ile Thr Ile Lys Ala Gly
                565                 570                 575

Val Asp Gly Glu Asn Ser Asp Ser Asp Ala Thr Asn Asn Ala Asn Leu
            580                 585                 590

Thr Ile Lys Thr Lys Glu Leu Lys Leu Thr Gln Asp Leu Asn Ile Ser
        595                 600                 605

Gly Phe Asn Lys Ala Glu Ile Thr Ala Lys Asp Gly Ser Asp Leu Thr
    610                 615                 620

Ile Gly Asn Thr Asn Ser Ala Asp Ser Thr Asn Ala Lys Lys Val Thr
625                 630                 635                 640

Phe Asn Gln Val Lys Asp Ser Lys Ile Ser Ala Gly Asp His Asn Val
                645                 650                 655

Thr Leu Asn Ser Lys Val Glu Thr Ser Gly Asn Thr Asp Asn Thr Gly
            660                 665                 670

Asp Gly Ser Gly Asn Asn Ala Gly Leu Thr Ile Ala Ala Lys Asn Val
        675                 680                 685

Glu Val Lys Asn Asn Ile Thr Ser Asn Lys Thr Val Asn Ile Thr Ala
    690                 695                 700

Ser Glu Lys Leu Thr Thr Lys Ala Asp Ala Thr Ile Asn Ala Thr Thr
705                 710                 715                 720

Gly Asn Val Glu Val Thr Ala Lys Thr Gly Asp Ile Lys Gly Glu Val
```

```
                725                 730                 735

Lys Ser Thr Ser Gly Asn Val Asn Ile Thr Ala Asn Gly Asp Thr Leu
            740                 745                 750

Asn Val Ser Asn Val Ser Gly Asn Ala Val Thr Ile Thr Ala Asp Lys
        755                 760                 765

Gly Lys Leu Thr Thr Gln Ala Ser Ser Ser Ile Thr Ser Asn Asn Gly
    770                 775                 780

Gln Thr Thr Leu Thr Ala Lys Asp Gly Ser Ile Ala Gly Ser Ile Asn
785                 790                 795                 800

Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Val Glu
                805                 810                 815

Gly Ser Asn Ile Asn Ala Ala Ser Gly Thr Leu Val Ile Asn Ala Lys
            820                 825                 830

Asp Ala Lys Leu Asn Gly Ala Ala Ser Gly Asp His Thr Val Val Asn
        835                 840                 845

Ala Thr Asn Ala Ser Gly Ser Gly Ser Val Thr Ala Val Thr Ser Ser
    850                 855                 860

Asn Val Asn Ile Thr Gly Asp Leu Ser Thr Val Asn Gly Leu Asn Ile
865                 870                 875                 880

Ile Ser Lys Asn Gly Arg Asn Thr Val Val Leu Lys Gly Thr Glu Ile
                885                 890                 895

Glu Val Lys Tyr Ile Gln Pro Gly Val Ala Ser Val Glu Glu Val Ile
            900                 905                 910

Glu Ala Lys Arg Val Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu
        915                 920                 925

Arg Glu Thr Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Ile Glu
    930                 935                 940

Pro Asn Asn Thr Ile Thr Val Asn Thr Gln Asn Glu Phe Thr Thr Arg
945                 950                 955                 960

Pro Ser Ser Gln Val Thr Ile Ser Glu Gly Lys Ala Cys Phe Ser Ser
                965                 970                 975

Gly Asn Gly Ala Ala Val Cys Thr Asn Val Ala Asp Asp Gly Gln Gln
            980                 985                 990
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<210> 62
<211> 3568
<212> DNA
<213> Haemophilus influenzae

<400> 62

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agcaagaggc tcttttgtta atatcactgc caacaatgaa atcagagtta atagtgatat 240
caatatcgga ggcaactccc acctaaccct ctggagcagc aaaaataaaa acagtggcgt 300
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agaaggagat gtcgcctttg aaaaagggaa taacctaacc attacaggtc aaggaactat 480
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<210> 63
<211> 1188
<212> PRT
<213> Haemophilus influenzae

<400> 63

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Gly Asp Ala Gly Arg Ser Asp Thr Asn Leu Glu Asn Glu Glu Tyr Thr
             20                  25                  30

Gly Thr Gly Glu Ser Ala Asp Thr Pro Lys Arg Asn Asn Asn Thr Lys
         35                  40                  45

Thr Thr Leu Thr Asn Ser Thr Leu Glu Lys Ile Leu Ala Arg Gly Ser
     50                  55                  60

Phe Val Asn Ile Thr Ala Asn Asn Glu Ile Arg Val Asn Ser Asp Ile
 65                  70                  75                  80

Asn Ile Gly Gly Asn Ser His Leu Thr Leu Trp Ser Ser Lys Asn Lys
                 85                  90                  95

Asn Ser Gly Val Leu Ile Asn Gly Asn Ile Thr Ser Thr Ala Asn Gly
            100                 105                 110

Asn Leu Thr Ile Tyr Ser Ser Gly Trp Val Asp Ile His Lys Asn Ile
        115                 120                 125

Thr Leu Glu Ser Gly Arg Leu Asn Ile Thr Thr Lys Glu Gly Asp Val
    130                 135                 140

Ala Phe Glu Lys Gly Asn Asn Leu Thr Ile Thr Gly Gln Gly Thr Ile
145                 150                 155                 160

Thr Ala Gly Asn Asn Lys Gly Phe Arg Phe Glu Asn Val Ser Leu Asn
                165                 170                 175

Gly Thr Gly Thr Gly Leu Leu Phe Asn Leu Ser Arg Pro Gln Lys Asn
            180                 185                 190

Asn Ser Leu Val Thr Asn Tyr Phe Asn Gly Thr Leu Asn Ile Ser Gly
        195                 200                 205

Ser Val Asn Ile Ser Met Ile Pro Pro Asn Ala Thr Ser Asn Trp Tyr
    210                 215                 220

Ser Arg Tyr Lys Gly Arg Thr Tyr Trp Asn Ile Thr His Leu Asn Ala
225                 230                 235                 240

Ser Glu Asp Ser Asn Phe Asn Leu Thr Ile Asp Ser Ser Ala Glu Asp
                245                 250                 255

Gly Ser Ala Pro Leu Leu Ser Ser Tyr Thr Leu Asn Gly Ile Ser Phe
            260                 265                 270
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Thr Thr Asp Thr Thr Phe Asn Val Asn Lys Asn Ala Lys Val Asn Phe
        275                 280                 285

Asn Ile Lys Ala Pro Ile Gly Thr Ile Asn Gln Tyr Asn Asn Leu Asn
    290                 295                 300

Tyr Ala Leu Phe Asn Gly Asn Ile Ser Val Ser Gly Gly Gly Asn Val
305                 310                 315                 320

Thr Phe Arg Leu Asn Ala Ser Ser Ser Asn Gln Gln Thr Pro Gly Val
                325                 330                 335

Ile Ile Asn Ser Lys His Leu Asn Ala Ser Lys Gly Ser Ser Leu Arg
            340                 345                 350

Phe Glu Thr Thr Gly Ser Thr Lys Val Gly Phe Leu Ile Asn Asn Asp
        355                 360                 365

Leu Thr Leu Asn Ala Thr Gly Gly Asn Ile Ser Leu Leu Gln Val Glu
    370                 375                 380

Gly Ile Asp Gly Met Ile Gly Glu Gly Val Val Ala Lys Lys Asn Ile
385                 390                 395                 400

Thr Phe Thr Gly Gly Asn Ile Thr Phe Gly Ser Lys Lys Ala Ile Thr
                405                 410                 415

Glu Ile Lys Gly Asn Val Thr Ile Asn Glu Asn Thr Asn Ala Thr Leu
            420                 425                 430

Ile Gly Ser Asp Phe Asn Asp His Lys Lys Pro Leu Asn Ile Lys Gly
        435                 440                 445

Asp Val Val Asn Arg Gly Asn Leu Thr Ala Gly Gly Asn Val Ile Asn
    450                 455                 460

Ile Gly Gly Asn Leu Thr Val Glu Asn Gly Ala Asn Leu Lys Ala Ile
465                 470                 475                 480

Thr Asn Phe Thr Phe Asn Val Gly Gly Leu Phe Asn Asn Lys Gly Asn
                485                 490                 495

Ser Asn Ile Ser Ile Ala Arg Gly Gly Ala Lys Phe Lys Asp Ile Asn
            500                 505                 510

Asn Thr Ser Ser Leu Asn Ile Thr Thr Asn Ser Asp Thr Thr Tyr Arg
        515                 520                 525

Thr Ile Ile Glu Gly Asn Ile Thr Asn Lys Ala Gly Asp Leu Asn Ile
    530                 535                 540

Ile Asp Asn Lys Gly Asn Ala Glu Ile Gln Ile Gly Gly Asn Ile Ser
545                 550                 555                 560

Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp Lys Ile Asn Ile Thr
                565                 570                 575

Lys Gln Ile Thr Ile Lys Lys Gly Val Asn Gly Glu Asn Ser Asp Ser
```

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            580                 585                 590

Ser Thr Lys Ser Gln Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Lys
        595                 600                 605

Leu Thr Gln Asp Leu Asn Ile Ser Gly Phe Asn Lys Ala Lys Ile Val
    610                 615                 620

Ala Lys Asp Ser Ser Asn Leu Thr Ile Gly Asn Ser Asp Asp Ser Gly
625                 630                 635                 640

Asn Thr Ser Ala Lys Thr Val Thr Phe Asn Asn Val Lys Asp Ser Lys
                645                 650                 655

Ile Ser Ala Asp Gly His Lys Val Thr Leu Asn Ser Lys Val Lys Thr
            660                 665                 670

Leu Ser Asp Asn Asp Asn Asn Thr Glu Gly Gly Ser Asp Asn Asn Thr
        675                 680                 685

Gly Leu Thr Ile Thr Ala Lys Asp Val Glu Val Asn Asn Asn Ile Thr
    690                 695                 700

Ser His Lys Thr Val Asn Val Ser Ala Ala Asn Gly Gly Ile Thr Thr
705                 710                 715                 720

Lys Thr Gly Thr Thr Ile Asn Ala Thr Ala Gly Asn Val Glu Ile Thr
                725                 730                 735

Ala His Thr Gly Ser Ile Gln Gly Gly Ile Glu Ser Lys Pro Gly Ser
            740                 745                 750

Val Thr Ile Val Ala Gly Gly Asp Thr Leu Ala Val Gly Asn Ile Ser
        755                 760                 765

Gly Asn Ala Val Thr Val Thr Ala Asn Ser Gly Ala Leu Thr Thr Leu
    770                 775                 780

Ala Gly Ser Thr Ile Lys Gly Thr Glu Ser Ile Thr Thr Ser Ser Gln
785                 790                 795                 800

Ser Gly Asn Ile Gly Gly Lys Ile Ser Gly Lys Thr Val Asn Val Lys
                805                 810                 815

Ala Thr Asn Ser Leu Thr Thr Gln Ala Asp Ser Lys Ile Glu Ala Thr
            820                 825                 830

Glu Gly Glu Ala Asn Val Thr Ser Lys Thr Ser Ile Ile Gly Gly Thr
        835                 840                 845

Ile Ser Gly Gly Thr Val Glu Val Thr Ala Thr Glu Gly Leu Thr Thr
    850                 855                 860

Gln Ala Gly Ser Thr Ile Thr Gly Thr Glu Ser Val Thr Thr Ser Ser
865                 870                 875                 880

Gln Ser Gly Asn Ile Gly Gly Met Ile Ser Gly Gly Lys Val Glu Val
                885                 890                 895
```

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Ser Ala Thr Lys Asp Leu Ile Thr Lys Ser Gly Ser Glu Ile Lys Ala
            900                 905                 910

Thr Ala Gly Glu Val Asn Val Thr Ser Ala Thr Gly Thr Ile Asp Gly
        915                 920                 925

Thr Ile Ser Gly Asn Thr Val Asn Val Thr Ala Asn Thr Gly Asp Leu
    930                 935                 940

Thr Val Glu Asp Ala Ala Lys Ile Asp Ala Thr Gly Gly Ala Ala Thr
945                 950                 955                 960

Leu Thr Ala Thr Ser Gly Lys Leu Thr Thr Lys Ala Ser Ser Ser Ile
                965                 970                 975

Thr Ser Ala Asn Asn Gln Val Asn Leu Ser Ala Lys Asp Gly Ser Ile
            980                 985                 990

Gly Gly Asn Ile Asn Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Ala
        995                 1000                1005

Leu Thr Thr Val Lys Gly Ser Ser Ile Asn Ala Asn Ser Gly Thr Leu
   1010                1015                1020

Val Ile Asn Ala Lys Asp Ala Glu Leu Asn Gly Glu Ala Ser Gly Asn
1025                1030                1035                1040

His Thr Val Val Asn Ala Thr Asn Ala Asn Gly Ser Gly Ser Val Ile
                1045                1050                1055

Ala Thr Thr Ser Ser Arg Val Asn Ile Thr Gly Asp Leu Ile Thr Ile
            1060                1065                1070

Asn Gly Leu Asn Ile Ile Ser Lys Asn Gly Ile Asn Thr Val Leu Leu
        1075                1080                1085

Lys Gly Val Lys Ile Asp Val Lys Tyr Ile Gln Pro Gly Ile Ala Ser
   1090                1095                1100

Val Asp Glu Val Ile Glu Ala Lys Arg Ile Leu Glu Lys Val Lys Asp
1105                1110                1115                1120

Leu Ser Asp Glu Glu Arg Glu Ala Leu Ala Lys Leu Gly Val Ser Ala
                1125                1130                1135

Val Arg Phe Ala Glu Pro Asn Asn Ala Ile Thr Ile Asn Thr Gln Asn
            1140                1145                1150

Glu Phe Thr Thr Arg Pro Ser Ser Gln Val Thr Ile Ser Glu Gly Lys
        1155                1160                1165

Val Cys Phe Leu Ile Gly Asn Gly Ala Thr Ile Cys Thr Asn Ile Ala
   1170                1175                1180

Asp Ile Glu Arg
1185
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<210> 64

<211> 3543
<212> DNA
<213> Haemophilus influenzae

<400> 64
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acaacactaa caaactcaac gcttgagaag atattagcaa gaggctcttt tgttaatatc 180
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<213> Haemophilus influenzae

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Pro Lys Arg Asn Asn Asn Thr Lys Thr Thr Leu Thr Asn Ser Thr Leu
         35                  40                  45

Glu Lys Ile Leu Ala Arg Gly Ser Phe Val Asn Ile Thr Ala Asn Asn
     50                  55                  60

Glu Ile Arg Val Asn Ser Asp Ile Asn Ile Gly Gly Asn Ser His Leu
 65                  70                  75                  80

Thr Leu Trp Ser Ser Lys Asn Lys Asn Ser Gly Val Leu Ile Asn Gly
                 85                  90                  95

Asn Ile Thr Ser Thr Ala Asn Gly Asn Leu Thr Ile Tyr Ser Ser Gly
            100                 105                 110

Trp Val Asp Ile His Lys Asn Ile Thr Leu Glu Ser Gly Arg Leu Asn
        115                 120                 125

Ile Thr Thr Lys Glu Gly Asp Val Ala Phe Glu Lys Gly Asn Asn Leu
    130                 135                 140

Thr Ile Thr Gly Gln Gly Thr Ile Thr Ala Gly Asn Asn Lys Gly Phe
145                 150                 155                 160

Arg Phe Glu Asn Val Ser Leu Asn Gly Thr Gly Thr Gly Leu Leu Phe
                165                 170                 175

Asn Leu Ser Arg Pro Gln Lys Asn Asn Ser Leu Val Thr Asn Tyr Phe
            180                 185                 190

Asn Gly Thr Leu Asn Ile Ser Gly Ser Val Asn Ile Ser Met Ile Pro
        195                 200                 205

Pro Asn Ala Thr Ser Asn Trp Tyr Ser Arg Tyr Lys Gly Arg Thr Tyr
    210                 215                 220

Trp Asn Ile Thr His Leu Asn Ala Ser Glu Asp Ser Asn Phe Asn Leu
225                 230                 235                 240
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Thr Ile Asp Ser Ser Ala Glu Asp Gly Ser Ala Pro Leu Leu Ser Ser
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Tyr Thr Leu Asn Gly Ile Ser Phe Thr Thr Asp Thr Thr Phe Asn Val
            260                 265                 270

Asn Lys Asn Ala Lys Val Asn Phe Asn Ile Lys Ala Pro Ile Gly Thr
        275                 280                 285

Ile Asn Gln Tyr Asn Asn Leu Asn Tyr Ala Leu Phe Asn Gly Asn Ile
    290                 295                 300

Ser Val Ser Gly Gly Gly Asn Val Thr Phe Arg Leu Asn Ala Ser Ser
305                 310                 315                 320

Ser Asn Gln Gln Thr Pro Gly Val Ile Ile Asn Ser Lys His Leu Asn
                325                 330                 335

Ala Ser Lys Gly Ser Ser Leu Arg Phe Glu Thr Thr Gly Ser Thr Lys
            340                 345                 350

Val Gly Phe Leu Ile Asn Asn Asp Leu Thr Leu Asn Ala Thr Gly Gly
        355                 360                 365

Asn Ile Ser Leu Leu Gln Val Glu Gly Ile Asp Gly Met Ile Gly Glu
    370                 375                 380

Gly Val Val Ala Lys Lys Asn Ile Thr Phe Thr Gly Gly Asn Ile Thr
385                 390                 395                 400

Phe Gly Ser Lys Lys Ala Ile Thr Glu Ile Lys Gly Asn Val Thr Ile
                405                 410                 415

Asn Glu Asn Thr Asn Ala Thr Leu Ile Gly Ser Asp Phe Asn Asp His
            420                 425                 430

Lys Lys Pro Leu Asn Ile Lys Gly Asp Val Val Asn Arg Gly Asn Leu
        435                 440                 445

Thr Ala Gly Gly Asn Val Ile Asn Ile Gly Gly Asn Leu Thr Val Glu
    450                 455                 460

Asn Gly Ala Asn Leu Lys Ala Ile Thr Asn Phe Thr Phe Asn Val Gly
465                 470                 475                 480

Gly Leu Phe Asn Asn Lys Gly Asn Ser Asn Ile Ser Ile Ala Arg Gly
                485                 490                 495

Gly Ala Lys Phe Lys Asp Ile Asn Asn Thr Ser Ser Leu Asn Ile Thr
            500                 505                 510

Thr Asn Ser Asp Thr Thr Tyr Arg Thr Ile Ile Glu Gly Asn Ile Thr
        515                 520                 525

Asn Lys Ala Gly Asp Leu Asn Ile Ile Asp Asn Lys Gly Asn Ala Glu
    530                 535                 540

Ile Gln Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile
545                 550                 555                 560
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Ser Ser Asp Lys Ile Asn Ile Thr Lys Gln Ile Thr Ile Lys Lys Gly
565 570 575

Val Asn Gly Glu Asn Ser Asp Ser Ser Thr Lys Ser Gln Ala Asn Leu
580 585 590

Thr Ile Lys Thr Lys Glu Leu Lys Leu Thr Gln Asp Leu Asn Ile Ser
595 600 605

Gly Phe Asn Lys Ala Lys Ile Val Ala Lys Asp Ser Ser Asn Leu Thr
610 615 620

Ile Gly Asn Ser Asp Asp Ser Gly Asn Thr Ser Ala Lys Thr Val Thr
625 630 635 640

Phe Asn Asn Val Lys Asp Ser Lys Ile Ser Ala Asp Gly His Lys Val
645 650 655

Thr Leu Asn Ser Lys Val Lys Thr Leu Ser Asp Asn Asp Asn Asn Thr
660 665 670

Glu Gly Gly Ser Asp Asn Asn Thr Gly Leu Thr Ile Thr Ala Lys Asp
675 680 685

Val Glu Val Asn Asn Asn Ile Thr Ser His Lys Thr Val Asn Val Ser
690 695 700

Ala Ala Asn Gly Gly Ile Thr Thr Lys Thr Gly Thr Thr Ile Asn Ala
705 710 715 720

Thr Ala Gly Asn Val Glu Ile Thr Ala His Thr Gly Ser Ile Gln Gly
725 730 735

Gly Ile Glu Ser Lys Pro Gly Ser Val Thr Ile Val Ala Gly Gly Asp
740 745 750

Thr Leu Ala Val Gly Asn Ile Ser Gly Asn Ala Val Thr Val Thr Ala
755 760 765

Asn Ser Gly Ala Leu Thr Thr Leu Ala Gly Ser Thr Ile Lys Gly Thr
770 775 780

Glu Ser Ile Thr Thr Ser Ser Gln Ser Gly Asn Ile Gly Gly Lys Ile
785 790 795 800

Ser Gly Lys Thr Val Asn Val Lys Ala Thr Asn Ser Leu Thr Thr Gln
805 810 815

Ala Asp Ser Lys Ile Glu Ala Thr Glu Gly Glu Ala Asn Val Thr Ser
820 825 830

Lys Thr Ser Ile Ile Gly Gly Thr Ile Ser Gly Gly Thr Val Glu Val
835 840 845

Thr Ala Thr Glu Gly Leu Thr Thr Gln Ala Gly Ser Thr Ile Thr Gly
850 855 860

Thr Glu Ser Val Thr Thr Ser Ser Gln Ser Gly Asn Ile Gly Gly Met

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Lys Ser Gly Ser Glu Ile Lys Ala Thr Ala Gly Glu Val Asn Val Thr
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Ser Ala Thr Gly Thr Ile Asp Gly Thr Ile Ser Gly Asn Thr Val Asn
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Val Thr Ala Asn Thr Gly Asp Leu Thr Val Glu Asp Ala Ala Lys Ile
    930                 935                 940

Asp Ala Thr Gly Gly Ala Ala Thr Leu Thr Ala Thr Ser Gly Lys Leu
945                 950                 955                 960

Thr Thr Lys Ala Ser Ser Ser Ile Thr Ser Ala Asn Asn Gln Val Asn
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Leu Ser Ala Lys Asp Gly Ser Ile Gly Gly Asn Ile Asn Ala Ala Asn
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Val Thr Leu Asn Thr Thr Gly Ala Leu Thr Thr Val Lys Gly Ser Ser
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Ile Asn Ala Asn Ser Gly Thr Leu Val Ile Asn Ala Lys Asp Ala Glu
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Leu Asn Gly Glu Ala Ser Gly Asn His Thr Val Val Asn Ala Thr Asn
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Ala Asn Gly Ser Gly Ser Val Ile Ala Thr Thr Ser Ser Arg Val Asn
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Ile Thr Gly Asp Leu Ile Thr Ile Asn Gly Leu Asn Ile Ile Ser Lys
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Asn Gly Ile Asn Thr Val Leu Leu Lys Gly Val Lys Ile Asp Val Lys
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Tyr Ile Gln Pro Gly Ile Ala Ser Val Asp Glu Val Ile Glu Ala Lys
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Arg Ile Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu Arg Glu Ala
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Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Ala Glu Pro Asn Asn
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Ala Ile Thr Ile Asn Thr Gln Asn Glu Phe Thr Thr Arg Pro Ser Ser
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Gln Val Thr Ile Ser Glu Gly Lys Val Cys Phe Leu Ile Gly Asn Gly
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<212> PRT
<213> Haemophilus influenzae

<400> 67

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             20                  25                  30

Gly Ser Glu Lys Pro Ala Arg Met Lys Val Arg His Leu Ala Leu Lys
         35                  40                  45

Pro Leu Ser Ala Met Leu Leu Ser Leu Gly Val Thr Ser Ile Pro Gln
     50                  55                  60

Ser Val Leu Ala Ser Gly Leu Gln Gly Met Asp Val Val His Gly Thr
 65                  70                  75                  80

Ala Thr Met Gln Val Asp Gly Asn Lys Thr Ile Ile Arg Asn Ser Val
                 85                  90                  95
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Asp Asp Ile Ile Asn Trp Lys Gln Phe Asn Ile Asp Gln Asn Glu Met
          100                 105                 110

Val Gln Phe Leu Gln Glu Asn Asn Asn Ser Ala Val Phe Asn Arg Val
        115                 120                 125

Thr Ser Asn Gln Ile Ser Gln Leu Lys Gly Ile Leu Asp Ser Asn Gly
    130                 135                 140

Gln Val Phe Leu Ile Asn Pro Asn Gly Ile Thr Ile Gly Lys Asp Ala
145                 150                 155                 160

Ile Ile Asn Thr Asn Gly Phe Thr Ala Ser Thr Leu Asp Ile Ser Asn
                165                 170                 175

Glu Asn Ile Lys Ala Arg Asn Phe Thr Phe Glu Gln Thr Lys Asp Lys
            180                 185                 190

Ala Leu Ala Glu Ile Val Asn His Gly Leu Ile Thr Val Gly Lys Asp
        195                 200                 205

Gly Ser Val Asn Leu Ile Gly Gly Lys Val Lys Asn Glu Gly Val Ile
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Ser Val Asn Gly Gly Ser Ile Ser Leu Leu Ala Gly Gln Lys Ile Thr
225                 230                 235                 240

Ile Ser Asp Ile Ile Asn Pro Thr Ile Thr Tyr Ser Ile Ala Ala Pro
                245                 250                 255

Glu Asn Glu Ala Val Asn Leu Gly Asp Ile Phe Ala Lys Gly Gly Asn
            260                 265                 270

Ile Asn Val Arg Ala Ala Thr Ile Arg Asn Gln Gly Lys Leu Ser Ala
        275                 280                 285

Asp Ser Val Ser Lys Asp Lys Ser Gly Asn Ile Val Leu Ser Ala Lys
    290                 295                 300

Glu Gly Glu Ala Glu Ile Gly Gly Val Ile Ser Ala Gln Asn Gln Gln
305                 310                 315                 320

Ala Lys Gly Gly Lys Leu Met Ile Thr Gly Asp Lys Val Thr Leu Lys
                325                 330                 335

Thr Gly Ala Val Ile Asp Leu Ser Gly Lys Glu Gly Gly Glu Thr Tyr
            340                 345                 350

Leu Gly Gly Asp Glu Arg Gly Glu Gly Lys Lys Gly Ile Gln Leu Ala
        355                 360                 365

Lys Lys Thr Ser Leu Glu Lys Gly Ser Thr Ile Asn Val Ser Gly Lys
    370                 375                 380

Glu Lys Gly Gly Arg Ala Ile Val Trp Gly Asp Ile Ala Leu Ile Asp
385                 390                 395                 400

Gly Asn Ile Asn Ala Gln Gly Ser Gly Asp Ile Ala Lys Thr Gly Gly
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Val Asp Ala Lys Glu Trp Leu Leu Asp Pro Asp Asn Val Ser Ile Asn
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Ala Glu Thr Ala Gly Arg Ser Asn Thr Ser Glu Asp Asp Glu Tyr Thr
450 455 460

Gly Ser Gly Asn Ser Ala Ser Thr Pro Lys Arg Asn Lys Glu Lys Thr
465 470 475 480

Thr Leu Thr Asn Thr Thr Leu Glu Ser Ile Leu Lys Lys Gly Thr Phe
485 490 495

Val Asn Ile Thr Ala Asn Gln Arg Ile Tyr Val Asn Ser Ser Ile Asn
500 505 510

Leu Ser Asn Gly Ser Leu Thr Leu Trp Ser Glu Gly Arg Ser Gly Gly
515 520 525

Gly Val Glu Ile Asn Asn Asp Ile Thr Thr Gly Asp Asp Thr Arg Gly
530 535 540

Ala Asn Leu Thr Ile Tyr Ser Gly Gly Trp Val Asp Val His Lys Asn
545 550 555 560

Ile Ser Leu Gly Ala Gln Gly Asn Ile Asn Ile Thr Ala Lys Gln Asp
565 570 575

Ile Ala Phe Glu Lys Gly Ser Asn Gln Val Ile Thr Gly Gln Gly Thr
580 585 590

Ile Thr Ser Gly Asn Gln Lys Gly Phe Arg Phe Asn Asn Val Ser Leu
595 600 605

Asn Gly Thr Gly Ser Gly Leu Gln Phe Thr Thr Lys Arg Thr Asn Lys
610 615 620

Tyr Ala Ile Thr Asn Lys Phe Glu Gly Thr Leu Asn Ile Ser Gly Lys
625 630 635 640

Val Asn Ile Ser Met Val Leu Pro Lys Asn Glu Ser Gly Tyr Asp Lys
645 650 655

Phe Lys Gly Arg Thr Tyr Trp Asn Leu Thr Ser Leu Asn Val Ser Glu
660 665 670

Ser Gly Glu Phe Asn Leu Thr Ile Asp Ser Arg Gly Ser Asp Ser Ala
675 680 685

Gly Thr Leu Thr Gln Pro Tyr Asn Leu Asn Gly Ile Ser Phe Asn Lys
690 695 700

Asp Thr Thr Phe Asn Val Glu Arg Asn Ala Arg Val Asn Phe Asp Ile
705 710 715 720

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Lys Ala Pro Ile Gly Ile Asn Lys Tyr Ser Ser Leu Asn Tyr Ala Ser
                725                 730                 735

Phe Asn Gly Asn Ile Ser Val Ser Gly Gly Gly Ser Val Asp Phe Thr
            740                 745                 750

Leu Leu Ala Ser Ser Ser Asn Val Gln Thr Pro Gly Val Val Ile Asn
        755                 760                 765

Ser Lys Tyr Phe Asn Val Ser Thr Gly Ser Ser Leu Arg Phe Lys Thr
    770                 775                 780

Ser Gly Ser Thr Lys Thr Gly Phe Ser Ile Glu Lys Asp Leu Thr Leu
785                 790                 795                 800

Asn Ala Thr Gly Gly Asn Ile Thr Leu Leu Gln Val Glu Gly Thr Asp
                805                 810                 815

Gly Met Ile Gly Lys Gly Ile Val Ala Lys Lys Asn Ile Thr Phe Glu
            820                 825                 830

Gly Gly Asn Ile Thr Phe Gly Ser Arg Lys Ala Val Thr Glu Ile Glu
        835                 840                 845

Gly Asn Val Thr Ile Asn Asn Asn Ala Asn Val Thr Leu Ile Gly Ser
    850                 855                 860

Asp Phe Asp Asn His Gln Lys Pro Leu Thr Ile Lys Lys Asp Val Ile
865                 870                 875                 880

Ile Asn Ser Gly Asn Leu Thr Ala Gly Gly Asn Ile Val Asn Ile Ala
                885                 890                 895

Gly Asn Leu Thr Val Glu Ser Asn Ala Asn Phe Lys Ala Ile Thr Asn
            900                 905                 910

Phe Thr Phe Asn Val Gly Gly Leu Phe Asp Asn Lys Gly Asn Ser Asn
        915                 920                 925

Ile Ser Ile Ala Lys Gly Gly Ala Arg Phe Lys Asp Ile Asp Asn Ser
    930                 935                 940

Lys Asn Leu Ser Ile Thr Thr Asn Ser Ser Ser Thr Tyr Arg Thr Ile
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Ile Ser Gly Asn Ile Thr Asn Lys Asn Gly Asp Leu Asn Ile Thr Asn
                965                 970                 975

Glu Gly Ser Asp Thr Glu Met Gln Ile Gly Gly Asp Val Ser Gln Lys
            980                 985                 990

Glu Gly Asn Leu Thr Ile Ser Ser Asp Lys Ile Asn Ile Thr Lys Gln
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Ile Thr Ile Lys Ala Gly Val Asp Gly Glu Asn Ser Asp Ser Asp Ala
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Thr Asn Asn Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Lys Leu Thr
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Asp Gly Ser Asp Leu Thr Ile Gly Asn Thr Asn Ser Ala Asp Gly Thr
1060 1065 1070

Asn Ala Lys Lys Val Thr Phe Asn Gln Val Lys Asp Ser Lys Ile Ser
1075 1080 1085

Ala Asp Gly His Lys Val Thr Leu His Ser Lys Val Glu Thr Ser Gly
1090 1095 1100

Ser Asn Asn Asn Thr Glu Asp Ser Ser Asp Asn Asn Ala Gly Leu Thr
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Ile Asp Ala Lys Asn Val Thr Val Asn Asn Asn Ile Thr Ser His Lys
1125 1130 1135

Ala Val Ser Ile Ser Ala Thr Ser Gly Glu Ile Thr Thr Lys Thr Gly
1140 1145 1150

Thr Thr Ile Asn Ala Thr Thr Gly Asn Val Glu Ile Thr Ala Gln Thr
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Gly Ser Ile Leu Gly Gly Ile Glu Ser Ser Ser Gly Ser Val Thr Leu
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Thr Ala Thr Glu Gly Ala Leu Ala Val Ser Asn Ile Ser Gly Asn Thr
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Val Thr Val Thr Ala Asn Ser Gly Ala Leu Thr Thr Leu Ala Gly Ser
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Thr Ile Lys Gly Thr Glu Ser Val Thr Thr Ser Ser Gln Ser Gly Asp
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Ile Gly Gly Thr Ile Ser Gly Gly Thr Val Glu Val Lys Ala Thr Glu
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Ser Leu Thr Thr Gln Ser Asn Ser Lys Ile Lys Ala Thr Thr Gly Glu
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Ala Asn Val Thr Ser Ala Thr Gly Thr Ile Gly Gly Thr Ile Ser Gly
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Asn Thr Val Asn Val Thr Ala Asn Ala Gly Asp Leu Thr Val Gly Asn
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Gly Ala Glu Ile Asn Ala Thr Glu Gly Ala Ala Thr Leu Thr Thr Ser
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Ser Gly Lys Leu Thr Thr Glu Ala Ser Ser His Ile Thr Ser Ala Lys
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Gly Gln Val Asn Leu Ser Ala Gln Asp Gly Ser Val Ala Gly Ser Ile
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Asn Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Val

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Lys Gly Ser Asn Ile Asn Ala Thr Ser Gly Thr Leu Val Ile Asn Ala
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Lys Asp Ala Glu Leu Asn Gly Ala Ala Leu Gly Asn His Thr Val Val
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Asn Ala Thr Asn Ala Asn Gly Ser Gly Ser Val Ile Ala Thr Thr Ser
        1395                1400                1405

Ser Arg Val Asn Ile Thr Gly Asp Leu Ile Thr Ile Asn Gly Leu Asn
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Ile Ile Ser Lys Asn Gly Ile Asn Thr Val Leu Leu Lys Gly Val Lys
1425                1430                1435                1440

Ile Asp Val Lys Tyr Ile Gln Pro Gly Ile Ala Ser Val Asp Glu Val
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Ile Glu Ala Lys Arg Ile Leu Glu Lys Val Lys Asp Leu Ser Asp Glu
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Glu Arg Glu Ala Leu Ala Lys Leu Gly Val Ser Ala Val Arg Phe Ile
        1475                1480                1485

Glu Pro Asn Asn Thr Ile Thr Val Asp Thr Gln Asn Glu Phe Ala Thr
    1490                1495                1500

Arg Pro Leu Ser Arg Ile Val Ile Ser Glu Gly Arg Ala Cys Phe Ser
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Asn Ser Asp Gly Ala Thr Val Cys Val Asn Ile Ala Asp Asn Gly Arg
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<212> DNA
<213> Haemophilus influenzae

<400> 68

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<211> 1095
<212> PRT
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Lys Arg Asn Lys Glu Lys Thr Thr Leu Thr Asn Thr Thr Leu Glu Ser
35 40 45

Ile Leu Lys Lys Gly Thr Phe Val Asn Ile Thr Ala Asn Gln Arg Ile
50 55 60

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Tyr Val Asn Ser Ser Ile Asn Leu Ser Asn Gly Ser Leu Thr Leu Trp
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Ser Glu Gly Arg Ser Gly Gly Gly Val Glu Ile Asn Asn Asp Ile Thr
                85                  90                  95

Thr Gly Asp Asp Thr Arg Gly Ala Asn Leu Thr Ile Tyr Ser Gly Gly
            100                 105                 110

Trp Val Asp Val His Lys Asn Ile Ser Leu Gly Ala Gln Gly Asn Ile
        115                 120                 125

Asn Ile Thr Ala Lys Gln Asp Ile Ala Phe Glu Lys Gly Ser Asn Gln
    130                 135                 140

Val Ile Thr Gly Gln Gly Thr Ile Thr Ser Gly Asn Gln Lys Gly Phe
145                 150                 155                 160

Arg Phe Asn Asn Val Ser Leu Asn Gly Thr Gly Ser Gly Leu Gln Phe
                165                 170                 175

Thr Thr Lys Arg Thr Asn Lys Tyr Ala Ile Thr Asn Lys Phe Glu Gly
            180                 185                 190

Thr Leu Asn Ile Ser Gly Lys Val Asn Ile Ser Met Val Leu Pro Lys
        195                 200                 205

Asn Glu Ser Gly Tyr Asp Lys Phe Lys Gly Arg Thr Tyr Trp Asn Leu
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Thr Ser Leu Asn Val Ser Glu Ser Gly Glu Phe Asn Leu Thr Ile Asp
225                 230                 235                 240

Ser Arg Gly Ser Asp Ser Ala Gly Thr Leu Thr Gln Pro Tyr Asn Leu
                245                 250                 255

Asn Gly Ile Ser Phe Asn Lys Asp Thr Thr Phe Asn Val Glu Arg Asn
            260                 265                 270

Ala Arg Val Asn Phe Asp Ile Lys Ala Pro Ile Gly Ile Asn Lys Tyr
        275                 280                 285

Ser Ser Leu Asn Tyr Ala Ser Phe Asn Gly Asn Ile Ser Val Ser Gly
    290                 295                 300

Gly Gly Ser Val Asp Phe Thr Leu Leu Ala Ser Ser Ser Asn Val Gln
305                 310                 315                 320

Thr Pro Gly Val Val Ile Asn Ser Lys Tyr Phe Asn Val Ser Thr Gly
                325                 330                 335

Ser Ser Leu Arg Phe Lys Thr Ser Gly Ser Thr Lys Thr Gly Phe Ser
            340                 345                 350

Ile Glu Lys Asp Leu Thr Leu Asn Ala Thr Gly Gly Asn Ile Thr Leu
        355                 360                 365

Leu Gln Val Glu Gly Thr Asp Gly Met Ile Gly Lys Gly Ile Val Ala
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Lys Lys Asn Ile Thr Phe Glu Gly Gly Asn Ile Thr Phe Gly Ser Arg
385                 390                 395                 400

Lys Ala Val Thr Glu Ile Glu Gly Asn Val Thr Ile Asn Asn Asn Ala
                405                 410                 415

Asn Val Thr Leu Ile Gly Ser Asp Phe Asp Asn His Gln Lys Pro Leu
            420                 425                 430

Thr Ile Lys Lys Asp Val Ile Ile Asn Ser Gly Asn Leu Thr Ala Gly
        435                 440                 445

Gly Asn Ile Val Asn Ile Ala Gly Asn Leu Thr Val Glu Ser Asn Ala
    450                 455                 460

Asn Phe Lys Ala Ile Thr Asn Phe Thr Phe Asn Val Gly Gly Leu Phe
465                 470                 475                 480

Asp Asn Lys Gly Asn Ser Asn Ile Ser Ile Ala Lys Gly Gly Ala Arg
                485                 490                 495

Phe Lys Asp Ile Asp Asn Ser Lys Asn Leu Ser Ile Thr Thr Asn Ser
            500                 505                 510

Ser Ser Thr Tyr Arg Thr Ile Ile Ser Gly Asn Ile Thr Asn Lys Asn
        515                 520                 525

Gly Asp Leu Asn Ile Thr Asn Glu Gly Ser Asp Thr Glu Met Gln Ile
    530                 535                 540

Gly Gly Asp Val Ser Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp
545                 550                 555                 560

Lys Ile Asn Ile Thr Lys Gln Ile Thr Ile Lys Ala Gly Val Asp Gly
                565                 570                 575

Glu Asn Ser Asp Ser Asp Ala Thr Asn Asn Ala Asn Leu Thr Ile Lys
            580                 585                 590

Thr Lys Glu Leu Lys Leu Thr Gln Asp Leu Asn Ile Ser Gly Phe Asn
        595                 600                 605

Lys Ala Glu Ile Thr Ala Lys Asp Gly Ser Asp Leu Thr Ile Gly Asn
    610                 615                 620

Thr Asn Ser Ala Asp Gly Thr Asn Ala Lys Lys Val Thr Phe Asn Gln
625                 630                 635                 640

Val Lys Asp Ser Lys Ile Ser Ala Asp Gly His Lys Val Thr Leu His
                645                 650                 655

Ser Lys Val Glu Thr Ser Gly Ser Asn Asn Asn Thr Glu Asp Ser Ser
            660                 665                 670

Asp Asn Asn Ala Gly Leu Thr Ile Asp Ala Lys Asn Val Thr Val Asn
        675                 680                 685
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Asn Asn Ile Thr Ser His Lys Ala Val Ser Ile Ser Ala Thr Ser Gly
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Glu Ile Thr Thr Lys Thr Gly Thr Thr Ile Asn Ala Thr Thr Gly Asn
705                 710                 715                 720

Val Glu Ile Thr Ala Gln Thr Gly Ser Ile Leu Gly Gly Ile Glu Ser
                725                 730                 735

Ser Ser Gly Ser Val Thr Leu Thr Ala Thr Glu Gly Ala Leu Ala Val
            740                 745                 750

Ser Asn Ile Ser Gly Asn Thr Val Thr Val Thr Ala Asn Ser Gly Ala
        755                 760                 765

Leu Thr Thr Leu Ala Gly Ser Thr Ile Lys Gly Thr Glu Ser Val Thr
    770                 775                 780

Thr Ser Ser Gln Ser Gly Asp Ile Gly Gly Thr Ile Ser Gly Gly Thr
785                 790                 795                 800

Val Glu Val Lys Ala Thr Glu Ser Leu Thr Thr Gln Ser Asn Ser Lys
                805                 810                 815

Ile Lys Ala Thr Thr Gly Glu Ala Asn Val Thr Ser Ala Thr Gly Thr
            820                 825                 830

Ile Gly Gly Thr Ile Ser Gly Asn Thr Val Asn Val Thr Ala Asn Ala
        835                 840                 845

Gly Asp Leu Thr Val Gly Asn Gly Ala Glu Ile Asn Ala Thr Glu Gly
    850                 855                 860

Ala Ala Thr Leu Thr Thr Ser Ser Gly Lys Leu Thr Thr Glu Ala Ser
865                 870                 875                 880

Ser His Ile Thr Ser Ala Lys Gly Gln Val Asn Leu Ser Ala Gln Asp
                885                 890                 895

Gly Ser Val Ala Gly Ser Ile Asn Ala Ala Asn Val Thr Leu Asn Thr
            900                 905                 910

Thr Gly Thr Leu Thr Thr Val Lys Gly Ser Asn Ile Asn Ala Thr Ser
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Gly Thr Leu Val Ile Asn Ala Lys Asp Ala Glu Leu Asn Gly Ala Ala
    930                 935                 940

Leu Gly Asn His Thr Val Val Asn Ala Thr Asn Ala Asn Gly Ser Gly
945                 950                 955                 960

Ser Val Ile Ala Thr Thr Ser Ser Arg Val Asn Ile Thr Gly Asp Leu
                965                 970                 975

Ile Thr Ile Asn Gly Leu Asn Ile Ile Ser Lys Asn Gly Ile Asn Thr
            980                 985                 990

Val Leu Leu Lys Gly Val Lys Ile Asp Val Lys Tyr Ile Gln Pro Gly
        995                1000                1005
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Ile Ala Ser Val Asp Glu Val Ile Glu Ala Lys Arg Ile Leu Glu Lys
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Val Lys Asp Leu Ser Asp Glu Glu Arg Glu Ala Leu Ala Lys Leu Gly
1025 1030 1035 1040

Val Ser Ala Val Arg Phe Ile Glu Pro Asn Asn Thr Ile Thr Val Asp
1045 1050 1055

Thr Gln Asn Glu Phe Ala Thr Arg Pro Leu Ser Arg Ile Val Ile Ser
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Glu Gly Arg Ala Cys Phe Ser Asn Ser Asp Gly Ala Thr Val Cys Val
1075 1080 1085

Asn Ile Ala Asp Asn Gly Arg
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<210> 70
<211> 4937
<212> DNA
<213> Haemophilus influenzae

<400> 70
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<210> 71
<211> 1477
<212> PRT
<213> Haemophilus influenzae

<400> 71
Met Asn Lys Ile Tyr Arg Leu Lys Phe Ser Lys Arg Leu Asn Ala Leu

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Val Ala Val Ser Glu Leu Ala Arg Gly Cys Asp His Ser Thr Glu Lys
            20                  25                  30

Gly Phe Arg Tyr Val Thr Ile Phe Arg Cys Asn His Leu Ala Leu Lys
        35                  40                  45

Pro Leu Ser Ala Met Leu Leu Ser Leu Gly Val Thr Ser Ile Pro Gln
    50                  55                  60

Ser Val Leu Ala Ser Gly Leu Gln Gly Met Asp Val Val His Gly Thr
65                  70                  75                  80

Ala Thr Met Gln Val Asp Gly Asn Lys Thr Ile Ile Arg Asn Ser Val
                85                  90                  95

Asp Ala Ile Ile Asn Trp Lys Gln Phe Asn Ile Asp Gln Asn Glu Met
            100                 105                 110

Val Gln Phe Leu Gln Glu Asn Asn Asn Ser Ala Val Phe Asn Arg Val
        115                 120                 125

Thr Ser Asn Gln Ile Ser Gln Leu Lys Gly Ile Leu Asp Ser Asn Gly
    130                 135                 140

Gln Val Phe Leu Ile Asn Pro Asn Gly Ile Thr Ile Gly Lys Asp Ala
145                 150                 155                 160

Ile Ile Asn Thr Asn Gly Phe Thr Ala Ser Thr Leu Asp Ile Ser Asn
                165                 170                 175

Glu Asn Ile Lys Ala Arg Asn Phe Thr Phe Glu Gln Thr Lys Asp Lys
            180                 185                 190

Ala Leu Ala Glu Ile Val Asn His Gly Leu Ile Thr Val Gly Lys Asp
        195                 200                 205

Gly Ser Val Asn Leu Ile Gly Gly Lys Val Lys Asn Glu Gly Val Ile
    210                 215                 220

Ser Val Asn Gly Gly Ser Ile Ser Leu Leu Ala Gly Gln Lys Ile Thr
225                 230                 235                 240

Ile Ser Asp Ile Ile Asn Pro Thr Ile Thr Tyr Ser Ile Ala Ala Pro
                245                 250                 255

Glu Asn Glu Ala Val Asn Leu Gly Asp Ile Phe Ala Lys Gly Gly Asn
            260                 265                 270

Ile Asn Val Arg Ala Ala Thr Ile Arg Asn Gln Gly Lys Leu Ser Ala
        275                 280                 285

Asp Ser Val Ser Lys Asp Lys Ser Gly Asn Ile Val Leu Ser Ala Lys
    290                 295                 300

Glu Gly Glu Ala Glu Ile Gly Gly Val Ile Ser Ala Gln Asn Gln Gln
305                 310                 315                 320
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Ala Lys Gly Gly Lys Leu Met Ile Thr Gly Asp Lys Val Thr Leu Lys
                325                 330                 335

Thr Gly Ala Val Ile Asp Leu Ser Gly Lys Glu Gly Gly Glu Thr Tyr
            340                 345                 350

Leu Gly Gly Asp Glu Arg Gly Glu Gly Lys Asn Gly Ile Gln Leu Ala
        355                 360                 365

Lys Lys Thr Ser Leu Glu Lys Gly Ser Thr Ile Asn Val Ser Gly Lys
    370                 375                 380

Glu Lys Gly Gly Arg Ala Ile Val Trp Gly Asp Ile Ala Leu Ile Asp
385                 390                 395                 400

Gly Asn Ile Asn Ala Gln Gly Ser Gly Asp Ile Ala Lys Thr Gly Gly
                405                 410                 415

Phe Val Glu Thr Ser Gly His Tyr Leu Ser Ile Asp Ser Asn Ala Ile
            420                 425                 430

Val Lys Thr Lys Glu Trp Leu Leu Asp Pro Asp Asp Val Thr Ile Glu
        435                 440                 445

Ala Glu Asp Pro Leu Arg Asn Asn Thr Gly Ile Asn Asp Glu Phe Pro
    450                 455                 460

Thr Gly Thr Gly Glu Ala Ser Asp Pro Lys Lys Asn Ser Glu Leu Lys
465                 470                 475                 480

Thr Thr Leu Thr Asn Thr Thr Ile Ser Asn Tyr Leu Lys Asn Ala Trp
                485                 490                 495

Thr Met Asn Ile Thr Ala Ser Arg Lys Leu Thr Val Asn Ser Ser Ile
            500                 505                 510

Asn Ile Gly Ser Asn Ser His Leu Ile Leu His Ser Lys Gly Gln Arg
        515                 520                 525

Gly Gly Gly Val Gln Ile Asp Gly Asp Ile Thr Ser Lys Gly Gly Asn
    530                 535                 540

Leu Thr Ile Tyr Ser Gly Gly Trp Val Asp Val His Lys Asn Ile Thr
545                 550                 555                 560

Leu Asp Gln Gly Phe Leu Asn Ile Thr Ala Ala Ser Val Ala Phe Glu
                565                 570                 575

Gly Gly Asn Asn Lys Ala Arg Asp Ala Ala Asn Ala Lys Ile Val Ala
            580                 585                 590

Gln Gly Thr Val Thr Ile Thr Gly Glu Gly Lys Asp Phe Arg Ala Asn
        595                 600                 605

Asn Val Ser Leu Asn Gly Thr Gly Lys Gly Leu Asn Ile Ile Ser Ser
    610                 615                 620

Val Asn Asn Leu Thr His Asn Leu Ser Gly Thr Ile Asn Ile Ser Gly
625                 630                 635                 640
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Asn Ile Thr Ile Asn Gln Thr Thr Arg Lys Asn Thr Ser Tyr Trp Gln
                645                 650                 655

Thr Ser His Asp Ser His Trp Asn Val Ser Ala Leu Asn Leu Glu Thr
            660                 665                 670

Gly Ala Asn Phe Thr Phe Ile Lys Tyr Ile Ser Ser Asn Ser Lys Gly
        675                 680                 685

Leu Thr Thr Gln Tyr Arg Ser Ser Ala Gly Val Asn Phe Asn Gly Val
    690                 695                 700

Asn Gly Asn Met Ser Phe Asn Leu Lys Glu Gly Ala Lys Val Asn Phe
705                 710                 715                 720

Lys Leu Lys Pro Asn Glu Asn Met Asn Thr Ser Lys Pro Leu Pro Ile
                725                 730                 735

Arg Phe Leu Ala Asn Ile Thr Ala Thr Gly Gly Gly Ser Val Phe Phe
            740                 745                 750

Asp Ile Tyr Ala Asn His Ser Gly Arg Gly Ala Glu Leu Lys Met Ser
        755                 760                 765

Glu Ile Asn Ile Ser Asn Gly Ala Asn Phe Thr Leu Asn Ser His Val
    770                 775                 780

Arg Gly Asp Asp Ala Phe Lys Ile Asn Lys Asp Leu Thr Ile Asn Ala
785                 790                 795                 800

Thr Asn Ser Asn Phe Ser Leu Arg Gln Thr Lys Asp Asp Phe Tyr Asp
                805                 810                 815

Gly Tyr Ala Arg Asn Ala Ile Asn Ser Thr Tyr Asn Ile Ser Ile Leu
            820                 825                 830

Gly Gly Asn Val Thr Leu Gly Gly Gln Asn Ser Ser Ser Ser Ile Thr
        835                 840                 845

Gly Asn Ile Thr Ile Glu Lys Ala Ala Asn Val Thr Leu Glu Ala Asn
    850                 855                 860

Asn Ala Pro Asn Gln Gln Asn Ile Arg Asp Arg Val Ile Lys Leu Gly
865                 870                 875                 880

Ser Leu Leu Val Asn Gly Ser Leu Ser Leu Thr Gly Glu Asn Ala Asp
                885                 890                 895

Ile Lys Gly Asn Leu Thr Ile Ser Glu Ser Ala Thr Phe Lys Gly Lys
            900                 905                 910

Thr Arg Asp Thr Leu Asn Ile Thr Gly Asn Phe Thr Asn Asn Gly Thr
        915                 920                 925

Ala Glu Ile Asn Ile Thr Gln Gly Val Val Lys Leu Gly Asn Val Thr
    930                 935                 940

Asn Asp Gly Asp Leu Asn Ile Thr Thr His Ala Lys Arg Asn Gln Arg
```

945 950 955 960

Ser Ile Ile Gly Gly Asp Ile Ile Asn Lys Lys Gly Ser Leu Asn Ile
965 970 975

Thr Asp Ser Asn Asn Asp Ala Glu Ile Gln Ile Gly Gly Asn Ile Ser
980 985 990

Gln Lys Glu Gly Asn Leu Thr Ile Ser Ser Asp Lys Ile Asn Ile Thr
995 1000 1005

Lys Gln Ile Thr Ile Lys Lys Gly Ile Asp Gly Glu Asp Ser Ser Ser
1010 1015 1020

Asp Ala Thr Ser Asn Ala Asn Leu Thr Ile Lys Thr Lys Glu Leu Lys
1025 1030 1035 1040

Leu Thr Glu Asp Leu Ser Ile Ser Gly Phe Asn Lys Ala Glu Ile Thr
1045 1050 1055

Ala Lys Asp Gly Arg Asp Leu Thr Ile Gly Asn Ser Asn Asp Gly Asn
1060 1065 1070

Ser Gly Ala Glu Ala Lys Thr Val Thr Phe Asn Asn Val Lys Asp Ser
1075 1080 1085

Lys Ile Ser Ala Asp Gly His Asn Val Thr Leu Asn Ser Lys Val Lys
1090 1095 1100

Thr Ser Ser Ser Asn Gly Gly Arg Glu Ser Asn Ser Asp Asn Asp Thr
1105 1110 1115 1120

Gly Leu Thr Ile Thr Ala Lys Asn Val Glu Val Asn Lys Asp Ile Thr
1125 1130 1135

Ser Leu Lys Thr Val Asn Ile Thr Ala Ser Glu Lys Val Thr Thr Thr
1140 1145 1150

Ala Gly Ser Thr Ile Asn Ala Thr Asn Gly Lys Ala Ser Ile Thr Thr
1155 1160 1165

Lys Thr Gly Asp Ile Ser Gly Thr Ile Ser Gly Asn Thr Val Ser Val
1170 1175 1180

Ser Ala Thr Gly Asp Leu Thr Thr Lys Ser Gly Ser Lys Ile Glu Ala
1185 1190 1195 1200

Lys Ser Gly Glu Ala Asn Val Thr Ser Ala Thr Gly Thr Ile Gly Gly
1205 1210 1215

Thr Ile Ser Gly Asn Thr Val Asn Val Thr Ala Asn Ala Gly Asp Leu
1220 1225 1230

Thr Val Gly Asn Gly Ala Glu Ile Asn Ala Thr Glu Gly Ala Ala Thr
1235 1240 1245

Leu Thr Ala Thr Gly Asn Thr Leu Thr Thr Glu Ala Gly Ser Ser Ile
1250 1255 1260

```
Thr Ser Thr Lys Gly Gln Val Asp Leu Leu Ala Gln Asn Gly Ser Ile
1265                1270                1275                1280

Ala Gly Ser Ile Asn Ala Ala Asn Val Thr Leu Asn Thr Thr Gly Thr
                1285                1290                1295

Leu Thr Thr Val Ala Gly Ser Asp Ile Lys Ala Thr Ser Gly Thr Leu
            1300                1305                1310

Val Ile Asn Ala Lys Asp Ala Lys Leu Asn Gly Asp Ala Ser Gly Asp
        1315                1320                1325

Ser Thr Glu Val Asn Ala Val Asn Ala Ser Gly Ser Gly Ser Val Thr
    1330                1335                1340

Ala Ala Thr Ser Ser Ser Val Asn Ile Thr Gly Asp Leu Asn Thr Val
1345                1350                1355                1360

Asn Gly Leu Asn Ile Ile Ser Lys Asp Gly Arg Asn Thr Val Arg Leu
                1365                1370                1375

Arg Gly Lys Glu Ile Glu Val Lys Tyr Ile Gln Pro Gly Val Ala Ser
            1380                1385                1390

Val Glu Glu Val Ile Glu Ala Lys Arg Val Leu Glu Lys Val Lys Asp
        1395                1400                1405

Leu Ser Asp Glu Glu Arg Glu Thr Leu Ala Lys Leu Gly Val Ser Ala
    1410                1415                1420

Val Arg Phe Val Glu Pro Asn Asn Thr Ile Thr Val Asn Thr Gln Asn
1425                1430                1435                1440

Glu Phe Thr Thr Arg Pro Ser Ser Gln Val Ile Ile Ser Glu Gly Lys
                1445                1450                1455

Ala Cys Phe Ser Ser Gly Asn Gly Ala Arg Val Cys Thr Asn Val Ala
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Asp Asp Gly Gln Pro
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<210> 72
<211> 3108
<212> DNA
<213> Haemophilus influenzae

<400> 72

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gcatcaagaa aacttaccgt taatagctca atcaacatcg gaagcaactc ccacttaatt 240
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atttcatcag tgaataattt aacccacaat cttagtggca caattaacat atctgggaat 600
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<210> 73
<211> 1036
<212> PRT
<213> Haemophilus influenzae

<400> 73
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Gly Ile Asn Asp Glu Phe Pro Thr Gly Thr Gly Glu Ala Ser Asp Pro
20 25 30

Lys Lys Asn Ser Glu Leu Lys Thr Thr Leu Thr Asn Thr Thr Ile Ser
35 40 45

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Asn Tyr Leu Lys Asn Ala Trp Thr Met Asn Ile Thr Ala Ser Arg Lys
 50                  55                  60

Leu Thr Val Asn Ser Ser Ile Asn Ile Gly Ser Asn Ser His Leu Ile
65                  70                  75                  80

Leu His Ser Lys Gly Gln Arg Gly Gly Gly Val Gln Ile Asp Gly Asp
                85                  90                  95

Ile Thr Ser Lys Gly Gly Asn Leu Thr Ile Tyr Ser Gly Gly Trp Val
            100                 105                 110

Asp Val His Lys Asn Ile Thr Leu Asp Gln Gly Phe Leu Asn Ile Thr
        115                 120                 125

Ala Ala Ser Val Ala Phe Glu Gly Gly Asn Asn Lys Ala Arg Asp Ala
    130                 135                 140

Ala Asn Ala Lys Ile Val Ala Gln Gly Thr Val Thr Ile Thr Gly Glu
145                 150                 155                 160

Gly Lys Asp Phe Arg Ala Asn Asn Val Ser Leu Asn Gly Thr Gly Lys
                165                 170                 175

Gly Leu Asn Ile Ile Ser Ser Val Asn Asn Leu Thr His Asn Leu Ser
            180                 185                 190

Gly Thr Ile Asn Ile Ser Gly Asn Ile Thr Ile Asn Gln Thr Thr Arg
        195                 200                 205

Lys Asn Thr Ser Tyr Trp Gln Thr Ser His Asp Ser His Trp Asn Val
    210                 215                 220

Ser Ala Leu Asn Leu Glu Thr Gly Ala Asn Phe Thr Phe Ile Lys Tyr
225                 230                 235                 240

Ile Ser Ser Asn Ser Lys Gly Leu Thr Thr Gln Tyr Arg Ser Ser Ala
                245                 250                 255

Gly Val Asn Phe Asn Gly Val Asn Gly Asn Met Ser Phe Asn Leu Lys
            260                 265                 270

Glu Gly Ala Lys Val Asn Phe Lys Leu Lys Pro Asn Glu Asn Met Asn
        275                 280                 285

Thr Ser Lys Pro Leu Pro Ile Arg Phe Leu Ala Asn Ile Thr Ala Thr
    290                 295                 300

Gly Gly Gly Ser Val Phe Phe Asp Ile Tyr Ala Asn His Ser Gly Arg
305                 310                 315                 320

Gly Ala Glu Leu Lys Met Ser Glu Ile Asn Ile Ser Asn Gly Ala Asn
                325                 330                 335

Phe Thr Leu Asn Ser His Val Arg Gly Asp Asp Ala Phe Lys Ile Asn
            340                 345                 350

Lys Asp Leu Thr Ile Asn Ala Thr Asn Ser Asn Phe Ser Leu Arg Gln
        355                 360                 365
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Thr Lys Asp Asp Phe Tyr Asp Gly Tyr Ala Arg Asn Ala Ile Asn Ser
    370                 375                 380

Thr Tyr Asn Ile Ser Ile Leu Gly Gly Asn Val Thr Leu Gly Gly Gln
385                 390                 395                 400

Asn Ser Ser Ser Ser Ile Thr Gly Asn Ile Thr Ile Glu Lys Ala Ala
                405                 410                 415

Asn Val Thr Leu Glu Ala Asn Asn Ala Pro Asn Gln Gln Asn Ile Arg
            420                 425                 430

Asp Arg Val Ile Lys Leu Gly Ser Leu Leu Val Asn Gly Ser Leu Ser
        435                 440                 445

Leu Thr Gly Glu Asn Ala Asp Ile Lys Gly Asn Leu Thr Ile Ser Glu
    450                 455                 460

Ser Ala Thr Phe Lys Gly Lys Thr Arg Asp Thr Leu Asn Ile Thr Gly
465                 470                 475                 480

Asn Phe Thr Asn Asn Gly Thr Ala Glu Ile Asn Ile Thr Gln Gly Val
                485                 490                 495

Val Lys Leu Gly Asn Val Thr Asn Asp Gly Asp Leu Asn Ile Thr Thr
            500                 505                 510

His Ala Lys Arg Asn Gln Arg Ser Ile Ile Gly Gly Asp Ile Ile Asn
        515                 520                 525

Lys Lys Gly Ser Leu Asn Ile Thr Asp Ser Asn Asn Asp Ala Glu Ile
    530                 535                 540

Gln Ile Gly Gly Asn Ile Ser Gln Lys Glu Gly Asn Leu Thr Ile Ser
545                 550                 555                 560

Ser Asp Lys Ile Asn Ile Thr Lys Gln Ile Thr Ile Lys Lys Gly Ile
                565                 570                 575

Asp Gly Glu Asp Ser Ser Ser Asp Ala Thr Ser Asn Ala Asn Leu Thr
            580                 585                 590

Ile Lys Thr Lys Glu Leu Lys Leu Thr Glu Asp Leu Ser Ile Ser Gly
        595                 600                 605

Phe Asn Lys Ala Glu Ile Thr Ala Lys Asp Gly Arg Asp Leu Thr Ile
    610                 615                 620

Gly Asn Ser Asn Asp Gly Asn Ser Gly Ala Glu Ala Lys Thr Val Thr
625                 630                 635                 640

Phe Asn Asn Val Lys Asp Ser Lys Ile Ser Ala Asp Gly His Asn Val
                645                 650                 655

Thr Leu Asn Ser Lys Val Lys Thr Ser Ser Ser Asn Gly Gly Arg Glu
            660                 665                 670

Ser Asn Ser Asp Asn Asp Thr Gly Leu Thr Ile Thr Ala Lys Asn Val
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675 680 685

Glu Val Asn Lys Asp Ile Thr Ser Leu Lys Thr Val Asn Ile Thr Ala
690 695 700

Ser Glu Lys Val Thr Thr Thr Ala Gly Ser Thr Ile Asn Ala Thr Asn
705 710 715 720

Gly Lys Ala Ser Ile Thr Thr Lys Thr Gly Asp Ile Ser Gly Thr Ile
725 730 735

Ser Gly Asn Thr Val Ser Val Ser Ala Thr Gly Asp Leu Thr Thr Lys
740 745 750

Ser Gly Ser Lys Ile Glu Ala Lys Ser Gly Glu Ala Asn Val Thr Ser
755 760 765

Ala Thr Gly Thr Ile Gly Gly Thr Ile Ser Gly Asn Thr Val Asn Val
770 775 780

Thr Ala Asn Ala Gly Asp Leu Thr Val Gly Asn Gly Ala Glu Ile Asn
785 790 795 800

Ala Thr Glu Gly Ala Ala Thr Leu Thr Ala Thr Gly Asn Thr Leu Thr
805 810 815

Thr Glu Ala Gly Ser Ser Ile Thr Ser Thr Lys Gly Gln Val Asp Leu
820 825 830

Leu Ala Gln Asn Gly Ser Ile Ala Gly Ser Ile Asn Ala Ala Asn Val
835 840 845

Thr Leu Asn Thr Thr Gly Thr Leu Thr Thr Val Ala Gly Ser Asp Ile
850 855 860

Lys Ala Thr Ser Gly Thr Leu Val Ile Asn Ala Lys Asp Ala Lys Leu
865 870 875 880

Asn Gly Asp Ala Ser Gly Asp Ser Thr Glu Val Asn Ala Val Asn Ala
885 890 895

Ser Gly Ser Gly Ser Val Thr Ala Ala Thr Ser Ser Ser Val Asn Ile
900 905 910

Thr Gly Asp Leu Asn Thr Val Asn Gly Leu Asn Ile Ile Ser Lys Asp
915 920 925

Gly Arg Asn Thr Val Arg Leu Arg Gly Lys Glu Ile Glu Val Lys Tyr
930 935 940

Ile Gln Pro Gly Val Ala Ser Val Glu Glu Val Ile Glu Ala Lys Arg
945 950 955 960

Val Leu Glu Lys Val Lys Asp Leu Ser Asp Glu Glu Arg Glu Thr Leu
965 970 975

Ala Lys Leu Gly Val Ser Ala Val Arg Phe Val Glu Pro Asn Asn Thr
980 985 990

Ile Thr Val Asn Thr Gln Asn Glu Phe Thr Thr Arg Pro Ser Ser Gln
995 1000 1005

Val Ile Ile Ser Glu Gly Lys Ala Cys Phe Ser Ser Gly Asn Gly Ala
1010 1015 1020

Arg Val Cys Thr Asn Val Ala Asp Asp Gly Gln Pro
1025 1030 1035

<210> 74
<211> 25
<212> DNA
<213> Haemophilus influenzae

<400> 74
tcttttgctg tggctgatgc cccta 25

<210> 75
<211> 25
<212> DNA
<213> Haemophilus influenzae

<400> 75
cactgatagg ttgctcatat tcgcc 25

<210> 76
<211> 6
<212> PRT
<213> Haemophilus influenzae

<400> 76
Val Gly Val His Lys Asn
1 5

<210> 77
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